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THE POSITIVE BACKGROUND
OF
HINDU SOCIOLOGY

BOOK I.—NON-POLITICAL.

BY

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&C., &C.

WITH APPENDICES

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TO THE MEMORY OF
THE LATE ANTIQUARIAN AND ART-CRITIC,
DR. RAJENDRALALA MITRA,
THE FIRST INDIAN SCHOLAR, AND THE FATHER OF THE NATIONAL SCHOOL
OF INDIAN HISTORICAL RESEARCH

AND
THE LATE SCIENTIST,
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THE PIONEER OF INVESTIGATIONS REGARDING THE CHEMICO-MEDICAL
AND MEDICO-BOTANICAL ACHIEVEMENTS OF THE HINDUS;

AND
TO THE DISTINGUISHED SAVANT,
DR. BRAJENDRANATH SEAL,
A LIVING ENCYCLOPÆDIA OF MODERN SCIENCES AND ORIENTAL *Vidyas*,
THE APOSTLE OF HINDU CULTURE, AND INSPIRER OF
YOUNG INDIA IN PHILOSOPHICO-COMPARATIVE
STUDIES

THIS SMALL TRIBUTE OF SINCERE APPRECIATION AND
GENUINE REGARD
IS MOST RESPECTFULLY
DEDICATED
BY THEIR HUMBLE ADMIRER,
THE AUTHOR.

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FOREWORD.

The present volume is a part of '*The Positive Background of Hindu Sociology*' which is meant to be the Introduction to my English translation of the Sanskrit work on Sociology entitled *Sukranîti*, published as Volume XIII of the 'Sacred Books of the Hindus' Series. "The Positive Background" will be divided into two books: (1) Non-Political and (2) Political.

Besides the six chapters presented in this volume, Book I (Non-Political) will comprise :—

Chapter VII.—The Data of ancient Indian Art (Architecture, Sculpture and Painting).

Chapter VIII.—The Data of ancient Indian morals and manners (including socio-religious rites and institutions).

Chapter IX.—The Data of ancient Indian Pedagogy (including *vidyâs*, kalâs, and literature).

Chapter X.—The Data of ancient Indian Economics (including Statistics of Prices, Wages, &c.).

Book II (Political) will comprise the following :—

Chapter I.—The Data of ancient Indian Polity or Constitution, *i.e.*, form of Government (including the Theory of the *Râṣtra* or State).

Chapter II.—The Data of ancient Indian Public Finance.

Chapter III.—The Data of ancient Indian Jurisprudence.

Chapter IV.—The Data of ancient Indian International Law (the Doctrine of *mandala* as influencing the conceptions regarding 'spheres of influence' and 'spheres of interest').

The work is based mainly on an analytical study of Sukrâchâryya's code, so that the Data of Hindu Sociology collected here reflect strictly those phases of Indian national evolution which have influenced the authors of the Sukra cycle. This 'Positive Background,' therefore, is more or less a *statical* picture, and represents only such landmarks in the culture-history of the Hindus as are embodied in the single document *Sukranîti*. It must not be regarded as the result of any attempt to delineate the *dynamical* processes of the historic growth of Hindu civilisation or represent the several stages in the making of modern Indian life and thought. Recent works of this class are Principal Iyengar's *Life in Ancient India in the Age of Mantras*, and Mr. Narendranath Law's *Studies* in *Ancient Hindu Polity* (based on the *Arthasâstra* of Kauṭilya).

There are, however, a few historical sections and sub-sections in the 'Positive Background." These should not, on the one hand, be looked upon as recording the characteristics of the various cultural landmarks of Indian history; nor, on the other, be regarded as wholly superfluous digressions uncalled for in the *Introduction to Sukranîti.*

These historical sections have been necessary for two reasons. In the first place, the Code of Sukrâchâryya as well as the Data of Hindu life portrayed in it could not be presented in their proper perspective and their date as well as *locale* could not be ascertained unless Indian literature were studied chronologically as well as comparatively. In this respect the author feels that he has not been able to rise to the height of the occasion; for, as has been often stated with regret in the body of the book, he has had to ignore not only the Tâmil, Prâkrit, and vernacular evidences, but he has not even been able to utilise the more important documents of Sanskrit literature, not to speak of the unpublished manuscripts, telegraphic descriptions of which are to be found in Prof. Aufrecht's *Catalogus Catalogorum.*

In the second place, for a proper appreciation of the Hindu achievements in science, abstract or applied, it is indispensable to have always before one's mind's eye the landmarks in the history of western science. Much of the prevalent notions regarding the alleged inferiority of the Hindu genius in grappling with the problems of this mundane sphere and the extra-proneness of the Indian mind to metaphysical and unpractical speculations can vanish and be proved to be the results of mal-observation and non-observation leading "to half-truths which are really whole errors,"—only if we apply the Historico-Comparative method in studying Indian facts and phenomena. For all Indologists should remember that the wonderful achievements of the western nations are strictly speaking only a century old. So that if, while instituting a comparison between Hindu and Occidental cultures on the score of physical 'sciences' properly so-called and applied arts and industries, care were taken to eliminate from one's consideration the triumphs and discoveries of the last few generations, the Hindu scientific intellect would be found to have been in no way lagging behind. The sole corrective of false notions about Hindu civilisation is this "sense of historic perspective," which for the present generation of Indian scholars should be tantamount to a thorough familiarity with the history of European thought.

This brings me to an explanation of the title of the work. The *Introduction to Sukraniti* has been called 'The Positive Background of Hindu Sociology,' because Sukranîti as a *Nitisâstra*, *Arthasâstra*, *Dharmasâstra*, or *Dharmasutra* deals mainly with the topics implied by such Hindu categories as *Dharma* (morals), *Artha* (interests,) and *Kâma* (desires and passions) as opposed to *Mokṣa* or Salvation; and hence a study in Sukranîti should properly be a study in the non-*mokṣa* or non-transcendental and non-spiritual, *i.e.*, the secular, worldly and 'positive' elements of Hindu social economy.

The transcendental and other-worldly aspects of Hindu life and thought have been made too much of. It has been supposed, proved and believed during the last century that Hindu civilisation is essentially non-industrial, and non-political, *if* not pre-industrial and pre-political, and that its sole feature is ultra-asceticism and over-religiosity which delight in condemning the 'World, the Flesh and the Devil'!

Nothing can be farther from the truth. The Hindu has no doubt always placed the transcendental in the foreground of his life's scheme, but the Positive Background he has never forgotten or ignored. Rather it is in and through the positive, the secular, and the material that the transcendental, the spiritual and the metaphysical have been allowed to display themselves in Indian culture-history. The *Upaniṣads*, the *Vedânta*, and the *Gitâ* were not the works of imbeciles and weaklings brought up in an asylum of incapables and a hospital of incurables.

The Hindu has never been a 'scorner of the ground' but always 'true to the kindred points of heaven and home,' has been solicitous to enjoy the good things of this earthly earth and beautify this 'orb of green.' The literature, fine arts, religious consciousness, industrial life, political organisation, educational system, social economy, etc., of the Hindus—all have sought to realise this synthesis and harmony between the eternal antitheses and polarities of the universe: the worldly and other-worldly, the positive and transcendental, the many and the one, the Form and Spirit, Culture and Faith, Science and Religion, Caste disunions and Vedantic Oneness, Image-worship and the realisation of the Infinite (*Brahma*).

In the newly-published *Sâdhanâ*[1] of Rabindranath Tagore we have a collection of prose-lyrics, half-poetic and half-philosophic, dealing with this synthesis of world's eternal opposites or dualities. The papers on the *Problem of Evil*, *Realisation in Love*, *Realisation in Action*, *Realisation of Beauty*, in this volume of metaphysical essays in 'poet's prose' bring out the Hindu ideal of harmony between the Finite and the Infinite, Bondage and Freedom, Necessity or Law and Joy. "The Immortal being manifests himself in joy-form" (आनन्द रूपममृत यद्विभाति). "The joy which is without form, must create, must translate itself into forms." (P. 104.) It is this ideal, again, that is at once the inspiration and message of most of Tagore's Poetry, which thus carries *forward the transcendentalised positivism of the makers of Hindu civilisation* through the ages "along fresh fields and pastures new" or modern Bengali thought. The philosophy of reconciliation between the so-called Evil and Good, the Form and Spirit, Caste and Vedanta, Image and the Infinite has thus uttered itself in mystical Bengali verse:

भाव पेते चाय रूपेर माझारे अंग,
रूप पेते चाय भावेर माझारे छाडा।
असीम से चाहे सीमार निविड संग
सीमा हते चाय असीमेर माझे हारा॥"

This ideal of realising the Infinite in the Finite, the transcendental in the positive, manifested itself also in the educational system of Hindu India.

---

[1] Macmillan & Co.

The following is reproduced from my Bengali essay read at a Bengal Literary Conference about two years and a half ago translated subsequently for the 'Collegian' as *Pedagogy of the Hindus* :

" Was that system essentially monastic and ascetic, and did it kill all secular and social instincts of the learners ? Did the *Brahmachâris* come out from the preceptors' homes merely as monks, missionaries and *sanyâsis?* Could they not satisfy the diverse material wants of man? Did they not know how to provide for the necessaries, comforts and decencies of life? Was the education absolutely non-political ? Did not the students learn how to help in the administration of the state ? Were not social and political sciences, plant-life and dissection of animals, physical phenomena and chemical manipulations among the courses of instruction ? * * *

" How else can we account for the remarkable progress of the nation in architecture, sculpture, medicine, dyeing, weaving, shipping, navigation, military tactics and implements and all such aspects of socio-economic and economico-political life as have to depend on the help of physical and natural sciences? * * * The graduates trained up under the " Domestic System " were competent enough to found and administer states, undertake industrial and commercial enterprises; they were builders of empires and organisers of business concerns. It was because of this all-round and manly culture that the people of India could organise vast schemes of colonisation and conquest, and not content with being simply confined within the limits of mother India, could build up a Greater India beyond the seas, and spread culture, religion and humanity among the subject races. * * *

" It was under the influence of this system of education, again, that the ideal Hindu king " protected himself, but not through fear; followed the dictates of religion, but not through remorse; realised revenues, but not through greed, and enjoyed happiness, but not through attachment * * * That system certainly cannot be dismissed as inexpansive, inert and unfit to survive that could produce Riṣis from Vasiṣtha and Viswâmitra to Râm Prasâda and Râmkrisṇa Paramhamsa, scholars from Charaka, Pâṇini and Châṇakya to Chandra Kânta Tarkâlankâra—a race of eminent women from Maitreyi to Ahalyâ Bâi and Râṇi Bhavâni, monarchs from Chandragupta Maurya to Sivâji, and has continuously kept up the genial stream of national culture and civilisation through diverse forms and agencies by giving rise to hosts of thinkers and actors capable of solving different problems in different ages."

It is because the secular achievements of Hindu civilisation have not been accorded by scholars the attention they deserve, and a proper estimate of the Positive Background of Hindu socio-economic and socio-political life has not been framed, that the distorted picture of a race of metaphysicians, airy philosophers, and transcendental speculators has been drawn regarding Indian people to excite the pity of the go-ahead pushing occident and pander to the foolish, unthinking vanity of the present day fallen orient. The *Upaniṣads*, the *Vedânta*, the *Bhakti Sâstras*, the *Darsanas*, the *Gitâ*, and the whole body of Hindu transcendental literature in which people may find the 'solace of their life' as well as the 'solace of their death,' cannot, however, be fully appreciated and interpreted in the true light until and unless we bring to bear upon them the results of investigations regarding the social, economic, political, international and other human institutions and ideals, in the midst of which this literature has flourished and that have actually governed the life and activity of the Hindus. This mass of metaphysical lore requires, in fact, to be regarded as the " criticism," as Matthew Arnold would say, of Indian " life " and its problems and achievements. The transcendental speculation has to be understood and explained with reference to the *milieu* and environment according to the philosophico-comparative methods followed in the Schools of Literary Studies founded by such critics as Taine, Edmond Scherer, Sainte Beuve and Dowden. This should really be looked upon not as the sole but only as *one* of the various features in the organic growth and historic evolution of Indian literature, institutions, civics, arts and industries.

The principal correctives of the one-sided, partial and erroneous view about Hindu life and ideals, in addition to what we have already stated, are thus two :—(1) a more searching and detailed inquiry into the economic, political and art history of India, and (2) a study, according to the canons of scientific literary criticism, of the whole literature of Hindusthan, Sanskritic, and Dravidian, Prakrit and vernacular, in both its metaphysical and secular branches.

So far as the secular branches of Sanskrit literature are concerned, it would not be too much to remark that the adequate parallax for modifying and correcting the false notions about Hindu genius can be supplied if the *Kâvyas*, *Nâtyas*, *Kathâs*, *Purâṇas*, *Tantras*, *Itihâsas*, *Vâstuvidyâs*, *Silpasâstras*, *Arthasâstras*, *Nitisâstras*, *Dharma-sutras* and *Smritis* were critically investigated as documents of Indian historico-sociological development. These alone cannot fail to impress upon the inquirer to what great extent the eternal verities of the universe and the highest problems of life enunciated and discussed in the *Darsanas*, *Upaniṣads*, *Gitâ*, &c , have influenced and governed the ordinary pursuits of human life in India, and embodied in its thousand and one rites, usages, institutions and festivals ; to what enormous proportions the transcendental culture-lore of the Hindus has been humanised, secularised, and popularised by being translated and adapted into the common-place folk-lore—to what depth the Hindu ideal of realising the one in the many, the Infinite in the Finite, the Ideal in the Real, the Transcendental in the Positive, has been done into the actual life and work of the people. It will be evident to every close student of this literature that the synthesis of world's permanent polarities has been concretely demonstrated and manifested in the ever-moving gradations of the social polity known as *Varṇâsrama*, the Hymeneal rites and marriage rules, the Joint Family, the Cottage Industry, the autonomous system of co-operative village commonwealths, the *Âchâryyakulas*, the *Pariṣats*, the elastic theological apparatus and religious paraphernalia, the institution of kingship, and the doctrine of *mandala* or sphere of international activity that *constitute the complex web of Indian life.*

To take only one instance—the *Raghuvaṃsam* of Kâlidâsa, the immortal epic of Hindu India. It is impossible to study it from cover to cover without noticing how powerfully the greatest poet of Hindusthan has sought to depict this Hindu ideal of synthesis and harmony between the positive and the transcendental, the भोग (Enjoyment) and the त्याग (Renunciation). *Raghuvaṃsam* is the embodiment of Hindu India in the same sense that *Paradise Lost* is the embodiment of Puritan England. The grand ambitions of the Vikramâdityan era, its colossal energies, its thorough mastery over the things of this world, its all-round economic prosperity and brilliant political position, its Alexandrian sweep, its proud and stately outlook, its vigorous and robust taste are *all graphically painted in this national epic, together with the* "devotion to something afar from the sphere of our sorrow," 'the light that never was on sea or land,' the *sanyâsa*, *vairâgya*, *ahimsâ*, *yoga*, preparation for the other world, the idea of nothingness of this world and the desire for *mukti* or perpetual freedom from bondage.

This antithesis, polarity or duality has not, however, been revealed to us as a hotchpotch of hurly-burly and pell-mell conflicts and struggles, but presented in a serene, sober and well-adjusted system of harmony and synthesis which gives the " World, the Flesh and the Devil " their due, which recognises the importance and dignity of the secular, the worldly and the positive, and which establishes the transcendental, *not to the exclusion of*, but only above as well as in and through the civic, social, and economic achievements.

The greatest example of the Hindu ideal of synthesis, and hence of world's highest ideal, is to be found in the picture where Kâlidâsa beggars his hero, the Indian Napoleon, the conqueror of the four quarters, at the end of his proud *digvijaya* and 'triumph' by making him perform the *viśwajit* sacrifice, which necessitates the giving away of the whole of his earthly belongings (मृत्पात्रशेषा मकरोद् विभूतिं) Truly, the greatest artist of Hindusthan has sung of the Synthetic Ideal of the One in the Many, the Infinite in the Finite, the Transcendental in the Positive (ज्ञाने मौनं क्षमा शक्तौ त्यागे श्लाघाविपर्ययः) as the sole motto of the House of Raghu

"सोऽहमाजन्मशुद्धानामाफलोदयकर्म्मणाम् ।
आसमुद्रक्षितीशानामानाकरथवर्त्मनाम् ॥
यथाविधिहुताग्नीनां यथाकामार्चितार्थिनाम् ।
यथापराधदण्डानां यथाकालप्रबोधिनाम् ॥
त्यागाय सम्भृतार्थानां सत्याय मितभाषिणाम् ।
यशसे विजिगीषूणां प्रजायै गृहमेधिनाम् ॥
शैशवेऽभ्यस्तविद्यानां यौवने विषयैषिणाम् ।
वार्द्धक्ये मुनिवृत्तीनां योगेनान्ते तनुत्यजाम् ॥
रघूणामन्वयं वक्ष्ये..."

The same Vikramâdityân grasp of this mundane sphere, the same vigour *in attacking the problems* of secular life, the same human, practical and positive outlook, the same solicitude for the discharge of the 'lowliest duties' that characterise the heroes of Kâlidâsa whose natural ambition was no meaner than that of swaying not only the lithosphere from sea to sea, but also the atmosphere and the skies (आसमुद्रक्षितीशानामानाक रथवर्त्मनां), confront us at every step throughout the Smrīti, Nîti, Artha, Śilpa and Vâstu Literature. The Lectures of Professor Sukra, the Doctor of Social Philosophy and Legislation, to his disciples, the Asuras and Daityas, constitute one of the most important documents of this literature; and, as such, socio-economically and economico-politically illustrate the Kâlidâsic ideal of harmony between the positive and the transcendental or realisation of the transcendental in and through the positive.

Strictly speaking, the position of *Sukranîti* in this literature is unique and unparalleled. It is, in the first place, a manual of guidance to kings and statesmen, as well as the Bible of the demos—at once the work of a Machiavelli and a Rousseau. In the second place, it is a handbook of economics, politics, ethics, and what not.

Yâjnavalkya Smṛiti will ever command reverence as a text-book of Jurisprudence, *Manu Saṃhitâ*, because of the sanctity and age associated with the name of Manu, the first law-giver. So also the *Arthasâstra* of Kauṭilya, the Finance Minister of Chandragupta Maurya, the first Empire-builder in Hindusthan, must ever be looked up to by the historian as a contemporary Statute-Book or Imperial Gazetteer of India in one of the first epochs of her political consciousness, and as the handiwork of one of the world's most powerful statesmen of historic authenticity. But all these venerable documents of Hindu Positive literature cannot compare in comprehensiveness and encyclopædic character with the *Nitiśâstra* of the Professors of the Śukra cycle in the form in which we have it to-day. And comparatively modern though *Śukraniti* is, it is inevitable that *Kâmandaki Niti*, the abridgment of Kauṭilya's masterpiece, should pale into insignificance before it. For the whole culture of Hindu India, its methodology and its achievements have been really compressed into *Śukraniti* and have contributed to its making. For the moderners it is of inestimable value as "lifting the brain-cap" of mediæval India and letting them "see the thoughts" that were moving in her educated mind. As a text-book of Sociology, the *Nitiśâstra* of Sukrâchâryya is thus the Spencerian "*Synthetic philosophy*" of Sanskrit literature.

The study of *Sukraniti* is for all these reasons really a study of Hindu Positivism, the human, secular and worldly elements in Hindu national life and culture, the place of earthly things, *Samsâra*, *Vâsanâ*, *Bhoga*, desires, passions and attachments in the Hindu scheme of human existence—in short, a study of the positive background and foundations of Hindu Sociology, as opposed to its transcendental foreground and superstructure.

This work is humbly dedicated to three great masters of modern India who may be looked upon as pioneers in the study of the secular achievements of

Hindu culture. The celebrated archæologist and historian, Dr. Râjendralâl Mitra, is undoubtedly the first Indian 'scholar.' And yet the comprehensive grasp, erudition and industry which mark the researches embodied in his *Indo-Aryans*, *Antiquities of Orissa* and other writings in Journals, remain probably unsurpassed even now. It is to Dr. Mitra, the father of the National School of Indology and Indian historical scholarship, that every student of the positive branches of Hindu civilisation must begin by paying homage.

The scholar who, likewise, first brought to light the contributions of the Hindus in physical science is Dr. Udaychând Dutt. It is his researches in Hindu medicine, chemistry, and botany, that have paved the way for subsequent workers in the same field. And the monographs of Dr. Brajendranâth Seal (by securing whose services as King George V. Professor of Philosophy the Calcutta University has only honoured itself) on the *Physical, Chemical, and Mechanical Theories of the Hindus* as well as their "*Scientific Methodology*" (published along with Dr. Roy's *History of Hindu Chemistry*), have done more than any other work to establish philosophically the claims of Hindus as having contributed to world's scientific concepts, categories, and discoveries. It has been the special mission of Dr. Seal to demonstrate by the historico-comparative method that the Hindu explorers of the physical universe were not mere empirics who, by stretches of brilliant imagination or sage-like intuition, unconsciously hit upon some of the mysteries of Nature. Nor were they merely craftsmen, alchemists, industrialists, &c., engaged in practical agriculture and manufacture without any knowledge of the general principles and theories, but real scientists, researchers and investigators, who knew how to manipulate the machinery and logic of 'exact' science and patiently awaited the results of their observation and experiment.

Thus, as Dr. Seal remarks :—" Let us not superciliously dismiss these studies as 'learned lumber.' The astronomy and mathematics were not less advanced than those of Tycho Brahe, Cardan, and Fermat, the anatomy was equal to that of Vesalius, the Hindu logic and methodology were more advanced than that of Ramus and equal on the whole to Bacon's ; the physico-chemical theories as to combustion, heat, chemical affinity, clearer, more rational and more original than those of Van Helmont or Stahl, and the Grammar, whether of Sanskrit or Prakrit, the most scientific and comprehensive in the world before Bopp, Risk and Grimm." (Quoted by Dr. P. C. Roy in the Preface to the Second Edition of *Hindu Chemistry*, Vol. I).

There are many scholars from whose writings or discussions with whom I have derived direct or indirect help and suggestions. I should specially mention Mr. Haridâsa Pâlit, Research Scholar, District Council of National Education, Malda, Prof. Râdhâkamal Mookerji, M. A., Krishnath College, Berhampore (Bengal), Kumâr Narendra Nâth Law, M.A., B.L., Research Scholar and author, Calcutta, Rai Bahadur Sarat Chandra Dâs, C.I.E., Tibetan traveller and Chinese scholar (Darjeeling), Major B. D. Basu, I.M.S. (Retired), versatile scholar and linguist and learned editor of the 'Sacred Books of the Hindus Series,' Mr.

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I have to acknowledge also my deep debt of gratitude to Dr. Seal for his kindly allowing me to incorporate with this work a few chapters of his learned monographs on the physical sciences and scientific notions of the Hindus. It is superfluous to add that his papers on Hindu ideas about plants and plant-life, Hindu classification of animals, Hindu ideas about Nervous System, Heredity, Vital Force, &c., Hindu Mechanics and Hindu Acoustics, which are being first published through the medium of this work, have considerably added to its value and importance. The humble author begs to add that this has been the only means of rescuing precious treasures from the ravages of time and moths, which, thanks to the habits of the learned Doctor, have been often allowed to work havoc upon what would have been epoch-making studies in ancient Hindu culture that have thus been lost to the world for good.

Books quoted from or summarised for this work have been mentioned in the footnotes, as well as tabulated in the Bibliography. It may not, however, be out of place to state that several vernacular works and periodicals have been largely drawn upon, and that the following works have been of constant service: Prof. Aufrecht's *Catalogus Catalogorum*, Dr. Mitra's *Indo-Aryans*, Dr. Ray's *Hindu Chemistry*, Ram Raz's *Essay on the Architecture of the Hindus*, Vincent Smith's *Fine Art in India and Ceylon*, Sir Bhandarkar's *Peep into the Early History of India*, the Sanskrit Ms. *Yuktikalpataru*, Iyer's *Brihat Saṃhitâ*, Mookerji's *Indian Shipping* and Krishnaswamy Aiyangar's *Ancient India*, of which the chapter devoted to Chola history and administration must be of more than ordinary interest to students of early mediæval Indian life.

The libraries to which I am indebted are the National Council of Education Library at Calcutta, the Public Library at Allahabad and the Library of the Pâṇini Office which is specially rich in works on Indian antiquities, Sanskrit literature and modern science.

Finally, it remains to add that portions of this work were published as Magazine articles in the *Modern Review* (Calcutta), *Indian Review* (Madras), *Collegian* (Calcutta), *Hindusthan Review* (Allahabad), *Dacca Review* (Dacca), *Amrita Bâzâr Patrikâ* (Calcutta) and *Leader* (Allahabad).

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	(2) Folk Tales of Hindusthan (Ditto).
Vidyabhushan, Rajendranath.	Kâlidâsa (1908, Calcutta).
Viswakoṣa, Bengali Encyclopædia Indica (Calcutta) Vols. XVI, IX.	
Wales ...	Monograph on Wood Carving (Bombay, 1902).
Watt ...	Dictionary of the Economic Products of India (Superintendent of Government Printing, Calcutta, 1889-1896).
Weber ...	History of Indian Literature.
Weir ...	The Historical Basis of Modern Europe (1760-1815) London, Sonne Schein & Co., 1886.
Whitney and Lanman	Atharva-Veda (Harvard Oriental Series, Vols. 8 and 9, 1905).
Williams, Monier	Hinduism.
Wilson, Professor	Vishnu Purâṇa, (London, Trübner & Co., 1868).

N.B.—The Text of *Sukranîti* translated and used for this work is that edited by Dr. Gustav Oppert for Madras Government in 1882. And the references are always to *lines*, not to slokas. Thus Sukra. IV, ii, 131, indicates l. 131 of section ii of chapter iv.

THE POSITIVE BACK-GROUND OF HINDU SOCIOLOGY.

BOOK I.—NON-POLITICAL.

CHAPTER I.

RELATIVITY OF THE NÎTISÂSTRAS.

SECTION 1.

Hindu Culture and Sociology in Sûkranîti.

The Greek philosopher Plato was for some time tutor to a king of Syracuse in Sicily. Machiavelli, the Florentine diplomat, who has bequeathed his name to a school of politicians, was the author of a work that proved to be the Bible of kings and princes in mediæval Italy and Europe. The '*School-master*' of Roger Ascham was written for the princesses of an English royal family. The sage Sukrâchâryya, or at any rate, his *nom de plume*, belongs to the same gallery of world's *Râjgurus* or royal tutors. And his *Nitisâstra* or 'Treatise on Morals' is dogmatically asserted to be the sole authoritative[1] text-book on Political Science that should be used by Hindu kings and statesmen. This opinion of Sukrâchâryya about the position of *Nitisâstra* has been referred to by Kâmandaka also (II. 5): "According to the school of Usânas (Sukra) there is only one division of learning, namely *Dandaniti*, and the origin of all kinds of learning lies in this one." It would, therefore, be interesting to find out for which Hindu Court or Courts this manual was intended, or which supplied data for the rules and generalisations embodied in it.

The scope of a Nîtisâstra is more or less like that of a Dharma-sutra or Dharma-sâstra, one of the three divisions of Kalpa-sutra, which is one of the Six Vedângas or auxiliaries to Vedas. The province and relative position of Dharma-sutra in Sanskrit literature are thus described by Oldenberg:[2]

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[1] Chapter IV, Section vii, 851-6.

[2] Introduction to the *Grihyasutras* of Gobhila, Hiranyakesin etc. in the *Sacred Books of the East Series* xxxiii—iv,

"The frame within which the exposition of the Dharma-sutras is enclosed is an essentially broader one than in the case of the Grihya Sutras.* * The same phenomenon may also be observed in Buddhist Vinaya literature, where the exposition of the life of the community was at first given only in connection with the explanation of the list of sins (Pâtimokkha).* * It was not till later that a more comprehensive exposition, touching all the sides of the life of the community was attempted * * The Grihyaṣutras begin to treat of the events of the daily life of the household,* * confine themselves principally to the ritual or sacrificial side of household life, as is natural owing to their connexion with the older ritualistic literature (Srauta Sutra). Then the Dharma-sutras take an important step further; their purpose is to describe the whole of the rites and customs which prevail in private, civil and public life. They naturally among other things touch upon the ceremonies treated in the Grihyasutras, but they generally merely mention them and discuss the question of law and custom which are connected with them, without undertaking to go into the technical ordinances as to the way in which these ceremonies are to be performed."

It may be doubted at the outset if the class of writings called Dharmasâstras, Arthasâstras, and Nitisâstras to which *Sukranîti* belongs were (1) the work of a single individual or school, and (2) were ever the Gazetteers designed to embody the actual state of things, or Statute-Books meant for the guidance of the people and rulers of any particular epoch or region. It may be presumed that like Plato's *Republic* and *Laws*, Moore's *Utopia*, and Harrington's *Oceana*, *Sukranîti* is the product of the same inspiration that has lain at the bottom of all efforts to portray the ideal constitution of 'nowhere', describing things 'that never were on sea or land' in the history of world's speculative literature. Thus about *Manu Samhitâ*, Elphinstone remarks: "We must remember that a code is never the work of a single age, some of the earliest and rudest laws being preserved and incorporated with the improvements of the most enlightened times.** Even if the whole code referred to one period it would not show the real state of manners. Its injunctions are drawn from the model to which it is wished to raise the community, and its prohibitions from the worst state of crime which it was possible to apprehend.* * * Though early adopted as an unquestionable authority for the law, I should scarcely venture to regard it as a code drawn up for the regulation of a particular state under the sanction of a government. It seems rather to be the work of a learned man, designed to set forth his idea of a perfect commonwealth under Hindu institutions."[1]

According to this view it may be inappropriate to trace the production of *Sukranîti* to the patronage or influence of any of the numerous polities and royal courts in Hindu India. But even the most idealistic literature is not absolutely independent of age and clime. The Time-Spirit and Place-Spirit are too powerful to be totally ignored by human genius even if it consciously attempt it. The social environment and physical surroundings—both the aspects of the great envelope of man—cannot but leave their marks upon his intellectual consciousness and literary activities of any considerable magnitude. Leaving aside for the present, therefore, the most vexed of all questions in Indian history, the determination of the personality, identity and individuality of our author, we propose to investigate all the social and physical influences that are likely to have contributed to the making of *Sukraniti*, as available from a study of the data furnished by it. This investigation is really a study of the education received by our author himself, and of the literature drawn upon by him in the preparation of his work, in one word, a presentation of the whole culture embodied in, and pre-supposed by, *Sukraniti*. A study of this culture, and the "relativity" of *Sukraniti* to this envelope of physical and social forces and influences, would, however, incidentally furnish some of the evidences pointing to the age and locale of the work.

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[1] *History of India*, p. 12 (1889).

The relativity of *Sukraniti* to the social influences may be easily presumed like that of *Manu Samhitâ*, as has been done by Elphinstone: "It is evident that it incorporates the existing laws, and any alterations it may have introduced with a view to bring them up to its pre-conceived standard of perfection, must still have been drawn from the opinions which prevailed when it was written." So also the influence of physical and geographical factors on the work, and consequently its "relativity" to a particular region of the earth's surface cannot be missed.

Section 2.

Land-marks in the History of Hindu Political Development.

Even superficial students of *Sukraniti* do not fail to perceive that the Executive system, Judiciary, Military administration as well as other incidents of social, economic and political life described in it indicate a high degree of development, and are adapted not to simple village-republics and tribal commonwealths or city-states that we meet with in certain periods of Indian and European history, but are the outcome of the complex requirements of 'country'-states or Imperial organisations.

Now Ancient and Mediæval History of India furnishes the following more important types of political life that have evolved in connexion with the magnificent kingdoms or empires of the Hindus :—

1. The Maurya Empire of Chandragupta and Asoka (4th and 3rd centuries B.C.) embracing modern Afghanistan, the whole of Upper India, and Southern India, excluding the extreme south (Chola, Pândya, Kerala, Satyaputra and Ceylon).

2. The Gupta Empire (4th century A. D.) which was brought to an end by the incursions of the Huns.

3. The Empire of Harsavardhana (7th century A.D.) in Upper India during the latter part of whose reign Houen Thsang, the great master of Law from China, travelled in India.

Western India in the 10th and 11th centuries.[1] For the social expansion, religious assimilation, commercial progress, and Imperial achievements which we are wont to associate with the brightest eras of Hindu national history were going on in Eastern and Southern Hindusthan, unhampered as of yore, along the natural lines of progressive evolution up till the 13th and 14th centuries, while the buffer-princes of Lahore, Delhi, Ajmere, Kanauj, Malwa and Gujrat were performing their duties as by position the gate-keepers of India against the inroads of aggressive Islam.

The period of the mighty Pâlas and Cholas and their successors has witnessed the solution of problems which are of paramount importance in Indian history, literature, fine arts, philosophy, and religion. For it was during this age that the ocean of Tantraism finally swallowed up in a common philosophy the divergent channels of Mahâyâna Buddhism and latter-day Brahmanism ; that Vaisnavism and Śaivaism—the corner-stones of modern Hindu life-received the official stamp; the parents of present-day vernaculars were encouraged and 'protected' ; noble religious edifices were built, huge sealike tanks were excavated ; magnificent images were sculptured in bronze and stones ; the navigation of the sea was pushed forward, commercial and cultural intercourse between the Southerners and Easterners was promoted ; and India became really the School of Asia by supplying faith, literature, fine arts and material necessaries to China, Nepal, Tibet, Japan, Java, Burma and other lands beyond the seas. This period does, in fact, carry forward and develop the impulses, aspirations and tendencies of Hindu national life testified to by the Chinese Master of Law in Harśavardhana's time.

The Pâlas and Cholas are really the spiritual successors of the great Empire-builder and statesman of the 7th century. The epoch of their hegemony in Indian history is a brilliant sequel to the splendid epoch of Imperialism, religious toleration, maritime activity, and social amalgamation which it had been the policy of the great Harsa to pioneer and direct. Their services to the making of Indian national culture deserve the same meed of homage, therefore, from future historians as those of Sri Harsa.

And now that excavations, explorations, reading and interpretation of old vernacular manuscripts, copper-plate inscriptions, architectural monuments, numismatics, study of folklore, folk-songs, folk-arts and village traditions, Sanskrit literature, old sculptures and paintings, call up before us a picture of political and religious life, commercial and social intercourse, art-development, and literary progress no less definite and clear than what we have for any other period of Indian history, the necessity, of looking upon the Pâla-Chola period[2] as the really last phase of Hindu India cannot be too strongly advocated.

7. The Kingdoms of the Rajputs which beginning in the 9th or 10th centuries have continued their existence even now.

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[1] See Vincent Smith's *Early History* (second edition, pp. 330-331).

[2] *Another oft-neglected period of Indian history—one of the so-called epochs of* dissolution and decentralisation is the Andhra-Kushan age of Hindu national life.

8. The Kingdom of Kashmir which was ruled by Hindu kings till about the middle of the fourteenth century.

9. The Kingdom of Vijayanagara, called the 'Forgotten Empire' of the South in Mussalman times, the only important seat of Hindu culture in Mediæval India (14th—16th century A.D.).

10. The Empire of Mahârâstra under the Peshwas (18th century A.D.) whose administrative system has been elaborately described by the late Mr. Justice Ranade in his *Rise of the Maratha Power*.

These larger and more celebrated kingdoms and empires of the Hindus have flourished through over two thousand years of recorded history and in conditions of physical environment as varied as possible in a country like India, the 'epitome of the world.' The types of political organisation, therefore, that Indian history presents must be more or less diversified in character to meet the requirements of peoples living under diverse geographical and topographical influences. And one naturally expects a diversity of political codes or *Nitisâstras* or manuals of governmental rules. Inspite of the oneness and basic uniformity of Hindu life throughout India, the text-book of political life evolved in the extreme north, say Kashmir, is not likely to be that exactly adjusted to the needs of the Dravidians of the extreme south. Or again the rules and regulations which the Marathas framed for themselves in the west of India towards the close of the Mussalman period could not be copied *in toto* from a chapter of the *Nitisâstra* that was taught, say, to the Pâla Kings of Bengal in pre-Mussalman times. Politics like everything else of human life are the results of adaptation to the circumstances of time and place; and the history of a people has ever been powerfully influenced by the geography and topography of its habitat.

An analysis of the geographical facts and phenomena occurring in the Hindu *Nitisâstras* or treatises on morals (social, economic and political) is therefore likely to be an important factor in assigning each to the proper sets of physical and social conditions under which it was composed.

SECTION 3.

Mile-stones in the History of Hindu Political Speculation.

(*a*) *Arthasâstra.*

There is no difficulty about the *Arthasâstra* of Chânakya or Kautilya, the Minister of Chandragupta Mauryâ who for the first[1] time in Indian history conceived and executed the plan of a vast Empire, the limits of which it has not been possible for any monarch to reach or exceed.

Like Abul Fazl's *Ayeen Akbari*, the *Arthasâstra* may be looked upon as the *Imperial Gazetteer of India* in one of the most remarkable periods of

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[1] In the *Fundamental Unity of India* (Longmans Green & Co.) Prof. Mookerji traces the lindu conception of Imperialism and paramount Sovereignty from Vedic times (*vide* hapters XIX—XXIX).

Indian culture-history. The chapters of this monumental document are devoted exclusively to a description of the multifarious incidents of political life under Chandragupta's government, *e.g.* the working of the mines, the opening of irrigation works, the establishment of factories ; the maintenance of preserves and grazing grounds, of high ways of commerce, waterways, land-routes, and other facilities for communication ; the establishment of markets and stores ; the construction of embankments, dams and bridges ; the planting of fruit and flower trees, of medicinal plants and herbs (*i.e.* the establishment of Ayurvedic and pharmaceutical gardens) ; protection of the disabled, the helpless and the infirm, and also of beasts &c., famines, census, central and municipal government, livestock and many other social, juristic and economic institutions.

In the Introduction to Mr. Law's *Hindu Polity*[1] Prof. Radhakumud Mookerji of the National Council of Education, Bengal, has summarised the "arguments which may be advanced in support of the traditional and widely current view that the Arthasâstra of Kautilya is the work of Châṇakya the minister of Chandragupta and therefore belongs to the 4th century B.C." The writer has proved from both external and internal evidences—

(1) That the political connexion of Kautilya with Chandragupta as his Finance Minister is a fact and not a myth.

(2) That the *Arthasâstra* attributed to Kautilya is a genuine work of antiquity and not a traditionally handed down fable.

(3) That the work is the production of an individual author and not of a school, as is frequently the case with Indian treatises.

(*b*) *Kâmandaki Nîti.*

The work of Kâmandaka[2] is undoubtedly an abridged edition of *Artha Sâstra,* and the author himself is supposed to have been the disciple of Kautilya. A flood of light is thrown on the age and personality of the author of *Kâmandaki Nîti* from a report submitted by Dr. Frederick to the Batavian Society of Arts and Sciences on the Sanskrit literature of Bali. "It appears that the most popular work on Polity in that Island is entitled *Kâmandakiya Nîti Sâra.*" The researches of Sir Stamford Raffles and Crawford shew that the predominance of Buddhism in the Island of Java obliged the Hindu inhabitants of that place to retire in the fourth century of the Christian era with their household gods and their sacred scriptures to the island of Bali. * * * It has also been shewn by the same authorities that since the period of their exile, they had not any religious intercourse with India. It would therefore follow that the Sanskrit works now available in Bali, including the *Kâmandakiya Nîti* are of a date anterior to the 4th century A.D."

As a document of sociological information, this work is less valuable than *Sukranîti.* Its importance has, however, to be noticed because of the Chânakyân

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[1] Law's *Studies in Ancient Hindu Polity* (1914 Longmans Green and Co., London).

[2] *Kâmandakiya Nîti Sâra* published by Manmatha Nath Datta (Calcutta, 1896).

Doctrine of *Mandala* or "sphere of political activity and influences," which is not to be found in Sukra's work.

(*c*) *Other works.*

The difficulties with regard to the other extant (or published) treatises are immense, especially because we do not know of any other political fabric that has left its own Statute-Book. *Yuktikalpataru* and *Sukraniti* are the two exclusively socio-economic and socio-political treatises that we have come across up till now. Accounts of economic and political theories as well as practices are also to be met with in almost every branch of Sanskrit literature. Some of the *Purânas*, all the *Smritisâstras*, *Manusamhitâ*, *Mahâbhârata*, *Râmâyaṇa*, *Panchatantra*, *Raghuvanśa*, *Kirâtârjuniyam*, *Hitopadeśa*, *Daśakumâracharita*, together with treatises devoted to *Dhanur Veda* or Warfare and International Laws, notices of which are found in the celebrated *Catalogus Catalogorum of* Prof. Aufrecht, are especially rich in the subject-matter of *Nitisastras*.

Several such works are the following :—

Nitiprakâśika, Harivanśa, Utpalaparimâlâ, Charaṇavyuha, Krisṇavidyâbhyâsa prakaraṇa, Sankalpasuryyodaya, Prasangaratnâvali by Mâdhavarâma, Kâmasûtra (Vâtsâyana), Vidura-nîti, Vaisampâyana Nîti, and Brihatsamhitâ.

There is, besides, a Nitisâstra attributed to one Ghatakarpara mentioned by Stein in Kashmir Catalogue (p. 93). In the statement of sources for his series of learned papers on Hindu Polity contributed to the *Modern Review* (1913), Mr. K. P. Jayaswal mentions *Niti-Vâkyâmrita*[1] and the Marathi work *Dâsa-bodha*[2], the Bible of Sivaji, and refers to several Buddhist and Jaina texts. Some allusions to ancient civics are to be found in the Jaina works, *Nandi Sutra*, and *Riṣi mandala Prakaraṇavritti* quoted by Prof. R. K. Mookerji in the Introduction to Law's *Hindu Polity*.

(*d*) *Smriti Sâstras.*

The names of Smriti Sastras are given from Vasu's *Yâjñavalkya Smriti*, Book I, Chapter I, Introduction 4-5 in the " Sacred Books of the Hindus Series."

" Manu, Atri, Viṣṇu, Hârita, Yâjñavalkya, Uśanas, Ângiras, Yama, Âpastamba, Samvarta, Kâtyâyana, Bṛihaspati.

Parâśara, Vyâsa, Śankha, Likhita, Dakṣa, Gautama, Śâtâtapa, and Vasiṣṭha are the promulgators of Dharma Śâstras."

The Mitâkṣarâ Commentary on the above is as follows :—

" This Dharma Śastra propounded by Yâjñyavalkya should also be studied, such is the implied meaning of the above passage.

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[1] *Cf.* Samadeva 1. Edited in the Kasyamata series.

[2] Mr. Jayaswal gives the English title of this work as " Address to the Enslaved." Really, it should be " The Awakening (or Enlightenment) of Râma Dâsa."

"This is not an exhaustive enumeration (*parisaṅkhyâ*), but it is merely illustrative. Therefore, the Dharma Śâstras of Baudhâyana and others are not excluded.

"As each of these Smṛitis possesses authority, so the points not mentioned by one, may be supplied from the others.

"But if one set of Institutes contradicts the other, then there is an option (to follow any one of them)."[1]

Bâlambhaṭṭa's Gloss on the above furnishes much interesting information on the subject.

Devala gives the following list of the Dharma-Śâstras:—1. Manu, 2. Yama, 3. Vasiṣṭha. 4. Atri, 5. Dakṣa, 6. Viṣṇu, 7. Añgirâ, 8. Uśanâ, 9. Vâkpati, 10. Vyâsa; 11. Âpastamba, 12. Gautama, 13. Kâtyâyana, 14. Nârada, 15. Yâjñyavalkya, 16. Parâśara, 17. Samvarta, 18. Śaṅkha, 19. Hârîta, 20. Likhita.

In this list Nârada is an addition, while in the Yâjñyavalkya's list we have Sâtâtapa instead.

The Śaṅkha gives the following list:—1. Atri, 2. Bṛihaspati, 3. Uśanas, 4. Âpastamba, 5. Vasiṣṭha, 6. Kâtyâyana, 7. Parâśara, 8. Vyâsa, 9. Śaṇkha, 10. Likhita, 11. Samvarta, 12. Gautama, 13. Śâtâtapa, 14. Hârita, 15. Yâjñyavalkya, 16. Prachetas and the rest. By the phrase "and the rest" is meant 17. Budha, 18. Devala, 19. Sumantu, 20. Jamadagni, 21. Viśvâmitra, 22. Prajâpati, 23. Paiṭhînasi, 24. Pitâmaha, 25. Baudhâyana, 26. Chhâgaleya, 27. Jâbâla, 28. Chyavana, 29. Marîchi, 30. Kaśyapa.

In the Bhaviṣya Purâṇa we find the following addressed by Iśvara to Guha: "Having pondered over the texts of the eighteen Purâṇas, O child, and over the texts of the Smṛitis, beginning with Manu and which are thirty-six in number, I now tell thee.'.

[This shows that the Smṛitis are 36 in number.] The Smṛitis like the 1. Vṛiddha-Śâtâtapa, 2. Yogi—Yâjñyavalkya 3. Vṛiddha-Vasiṣṭha, 4. Vṛiddha-Manu, 5. Laghu-Hârita, &c., should be included in the well-known thirty-six under their original authors. [Thus Manu includes the ordinary and the Vṛiddha Manu, and so on.] Thus Yâjñyavalkya says (III. 110) "I have declared the science of Yoga."

Ratnâkara says: "we find in the Bhaviṣya Purâṇa itself the enumeration of other Smṛitis like Gobhila, Ṛiṣya Śringa, &c., which are over and above the thirty-six; so we conclude that thirty-six does not exhaust the number of Smṛitis, but is only an enumeration made by the Śiṣṭas." Those which are found as Gṛihya Sûtras and their Pariśiṣṭas, &c., they belong to a different Category: like the Purâṇas. As in the Bhaviṣya:—"The Maitrâyaṇîya, the Chhandogya, the Kaṭha, the Âpastamba, the Bhavṛichas, their Pariśiṣṭas and those called Khilas (are also Smṛitis)."

The Viṣṇu-*Dharma*, the Śiva-*Dharma*, the *Mahâbhârata*, and the Râmâyaṇa and the rest are also to be included among Smṛitis. As says the Bhaviṣya:—"The eighteen Purâṇas, the history of Râma (Râmâyaṇa), the Viṣṇu-Dharma-Sâstra, &c., the Śiva-Dharma; the fifth Veda called the Mahâbhârata composed by Kṛiṣṇa-Dvaipâyana, the Sauradharma, the Manavokta Dharma, are also taken as such by the wise," (adhyâya 4, v. 87-88).

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[1] See Manu, II, 14, for conflict of Śruti, &c.

"But when two sacred texts (Śruti) are conflicting both are held to be law; for both are pronounced by the wise to be valid law."

The words "as such" in the above mean that they are also followed by the great men, and are authoritative, because they are not decried or dispraised by any and followed by great men, so they are to be taken also as Smṛitis. The opinion that the Smṛitis are thirty-six only in number, or twenty-four only in number, is held only by some and is contradicted by others, and is not authoritative.

That the Smṛitis are Dharma-Śâstras (Institutes of Sacred Law) we learn from Manu II. 10, where it is said "The Vedas should be known as Śruti; and the Dharma-Śâstras as Smṛiti."

In Âṅgiras we find:—"The wise say that the following are Upa-Smṛitis:—Jâbâli, Nâchiketa, Chhandas, Laugâkṣi, Kaśyapa, Vyâsa, Sanat Kumâra, Śatadru, Janaka, Vyâghra, Kâtyâyana, Jâtukarnya, Kapiñjala, Baudhâyana, Kaṇâda, and Viśvâmitra."

In Hemâdri Dâna Khaṇḍa the following more are enumerated: "Vatsa, Pâraskara, Pulastya, Pulaha, Kratu, Ṛiṣyaśriṅga, Âtreya, Babhru, Vyâghra, Satyavrata; Bharadvâja, Gârgya, Kârṣṇâjini, Laugâkṣi, and Brahma-Sambhava."

The Smṛitis of Prajâpati, Yama, Budha, and Devala which are enumerated in Kalpataru are quoted by Hemâdri as authority in the course of other authorities.

The Kalpataru holds that the four sciences mentioned in the Viṣṇu Purâṇa (III 6. 26) as they relate to positive physical sciences should be taken as authority and Dharma in matters worldly. Those sciences are "the Âyurveda (Medicine), the Dhanurveda (Archery), the Gândharvaveda (Music), and the Artha Śâstra (the science of wealth)—thus the sciences are altogether eighteen" (Viṣṇu Purâṇa, III. 2. 26).

So also in the Śaiva Purâṇa, the Vâyavîya Saṁhita, chapter one, it is said: "O Romaharṣaṇa! O all-knowing! thou hast obtained through good luck a complete knowledge of all the Purâṇas from Vyâsa. The four Vedas, the six Aṅgas, the Mîmâṁsâ, the Nyâya, the Purâṇa and the Dharma Śastra are fourteen Vidyâs. The Âyurveda (medicine), the Dhanurveda (Archery), the Gândharvaveda (Music) and the Artha Śâstra (the science of wealth) are the additional four, making the Vidyâs eighteen. Of all these eighteen Vidyâs, treating of different topics, the original author and direct prophet is the Trident-handed Śiva: such is the saying." (Śiva Purâṇa, I. 23).

Though all these are sources of law, yet all of them do not deal with all matters; and sometimes they contradict each other. Therefore, the commentator says that, though each of them is an authority, yet the lacunae of one should be supplied from the other, where one is incomplete; and where they differ there is option. Manu has also taught this option in II. 14: "But when two sacred texts (Śrutis) are conflicting, both are held to be law; for both are pronounced by the wise to be valid law."

(e) *Traditional Abridgment of Nîti Sâstras.*

The *Smriti Sâstras* have for their subject-matter a greater amount of socio-religious topics than are usually dealt with in *Nîti Sâstras*. Their authorship is, besides, attributed to Rishis, as we have seen in the previous enumeration. The Rishi upon whom our work has been fathered is mentioned in the above list as Uśanas. It is believed that Uśanas or Sukrâcharyya was the last of the Rishis who meddled in Polity; and that since his time the whole science of morals (social, economic and political) called *Nîti Sâstras* has been designated after him.

Sukrâchâryya himself records the history of the abridgment of *Nîti Sâstras* towards the commencement of our work: "For the good of men Brahmâ had spoken that treatise on morals which contained 100 lakhs *i.e.*, 10 million slokas. By a process of selection the essence of that *Nîti Sâstra*, which was an extensive argumentative thesis, has been compiled in an abridged form by Vasiṣṭha and others like myself for the increase of prosperity of rulers of the earth and of others whose life is of short span."[1]

The same tradition[1] is otherwise stated thus:[*] "Formerly for the protection of creatures Brahmâ wrote the science of Polity in ten million chapters. Siva obtained this from Brahmâ and epitomised it in ten thousand chapters. His work is called Vaisâlakṣya from his name (Visâlâkṣa or large-eyed). Indra made an abridgment of it in five thousand chapters, and Sukra into one thousand. Thus it was gradually abridged by the various sages having in view the shortened life of the people around them."

(*f*) *Yukti-Kalpataru.*

The association of gods and Rishis with the works on *Nîti* and allied topics, and the tradition about their vast size and large number, as well as the custom of attributing works to one's *gurus* make the problem of a systematic treatment of Hindu political science all the more difficult. Equally puzzling is the association of works with historical characters, men of real flesh and blood, round whom, however, legends like those of Alexander and Charlemagne have grown up mystifying their age, locale as well as personality. One such work is the *Yukti Kalpataru*, giving "an account of all requirements in a royal court," as Professor Aufrecht observes. The work is still in manuscript, but was first noticed by Dr. Râjendralâl Mitra, and since his time, has been drawn upon by Indologists in their treatment of things Indian, specially secular matters. The work is attributed to King Bhoja (Vikramâditya?) of Dhâra in Malwa and has been described by the author as compiled from *nivandhas* or treatises of various *munis* or masters on the subjects. The following account of the work is being given from the manuscript (108 leaves), written in Bengali character, belonging to Mahâmahopâdhyâya Adityarâma Bhattâchârya, now in the possession of the Panini Office.[2]

The botanical name of the work has been explained at the beginning just after the salutation to Krishṇa, "the Parameswara, who by undoing the happiness of Kansa did really promote his happiness, who is worshipped by the gods and is really unadorable," and to the "makers of Sâstras whose words purify good men, even for the hearing." Just as a *Kalpavrikṣa* or the wishing-tree (like the wishing-cow) celebrated in Hindu religious lore yields the satisfaction of all desires, so "wise men by resorting to this *Kalpataru* (the treatise so called) can achieve the most longed-for objects." "The root of this tree is *Danda niti* (the science of punishment), the stem is *Jyotisha* (implying Astronomy, Astrology, Horoscopy and Mathematics according to the conception of the Hindus), the branches and flowers are the diverse *vidyâs* which deal with the facts observed (or the phenomenal world), the fruits are unknown and the *rasa* or sap is the nectar of the good, *i e.*, promotes their welfare." "That *Kalpataru* should be respected by Kings and ministers, who should study their interests and deliberate on them according to its dictates as well as those of other sâstras." "This is most conducive to the welfare of Kings and promotes also the weal of others," (*i.e.*, people).

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[1] Dutt's *Kâmandakiya Nîti Sâra.* (Calcutta, 1896.)

[2] The work is being edited by the present author.

Thus the very definition of the term *Yukti Kalpataru* as the title of a book introduces the topics of a *Nîti Sâstra* ; and, as a matter of fact, all the subjects dealt with in the work are the proper themes of works like *Sukranîti.* The following table of contents in the *Yukti Kalpataru* would indicate that the work is, like the *Artha Sâstra*, *Kâmandaki Nîti*, *Sukranîti*, and *Ghatakarparanîti*, really a socio-economic and socio-political treatise, and is an additional document of Hindu secular literature in the department of Dharmasutras, Arthasâstras or Nîti Sâstras :

1. Nîti Sâstra. 2. Guru (Preceptor) and Purohita (Priest). 3. Amâtya (Land Revenue officer), Mantri (Foreign minister) and Duta (ambassador). 4. Lekhaka (scribe) and Jyotirjna (astronomer). 5. Purâdhyakṣa (Mayor or Superintendent of the city), Vanadhyakṣa (Superintendent of Parks and Forests) 6. Koshavardhaṇa (Development of Financial resources). 7. Râjadâyâda (sharers of the royal income). 8. Kriṣi Karma (agriculture). 9. Rathin (charioteer), Sâdi (Horsemen or Cavalry). 10. Gajâroha (the art of elephant mounting, driving, etc.). 11. Yâna (Land and Water conveyances) 12. Yâtrâ (Expeditions). 13. Vigraha (warfare). 14. Chara (spy). 15. Dutalakshaṇa (Characteristics of ambassadors and spies). 16. Sandhi (Truce and Peace). 17. Âsana (Siege). 18. Dwaidha (Duplicity—a military technical term in Siege-craft). 19. Âśraya (seeking refuge or protection). 20. Dâṇḍa (Punishment). 21. Mantra (Policy or statecraft) 22-3. Dwandwa (Rivalry and Hostilities undertaken under two sets of circumstances, *e.g.*, i. *Akritrima*, *i.e.* conditions of natural fortifications, and ii. *Kritrima*, *i.e.*, conditions of artificial barriers and barricades, etc.) described with quotations from *Nîti Sâstra*, Garga, and one Bhoja.

24. Pura-nirmâṇa (Building of cities). 25. Kâla (the auspicious time). 26. The *vasati* (an arrangement of various wards or quarters) described by quotations from Bhoja and Parâsara. 27. Doṣaguṇa (good and bad effects, according to Astrology). 28. Vâstu (Houses). 29. Dingnirṇaya (Directions). 30. Lakṣaṇa (style or characteristics of Buildings) 31. Mâna (Measurements). 32. Doṣaguṇa (good and bad effects). 32. Kâlanirṇaya (when to begin building new houses). 33. *Vâstu praveshakâla* (when to enter new houses). 34. Dwâranirṇaya (laying out of doors). 35. Prâchîra (walls). 36-41. Vâstudaṇḍa (various measurements of houses), Vinâsa griha, ranga, and Râjagriha (the twelve species of Buildings).

42. Âsanas (Thrones). 43. Khatikas (bedsteads). 44. Pîtha (stools made of metals, stones or wood). 45. Chhatras (Umbrellas). 46. Dhwaja (Flags). 47. Châmara. 48. Chasaka (Drinking vessels). 49. Vastra (clothes). 50. Alankâra (ornaments).

51. Diamond. 52. Padmarâga (species of Emerald). 53-4. Examination, prices etc., of Diamonds. 55. Examination of Vidruma (corals). 56. Gomeda. 57-8. Pearls—their examination and prices. 59. Vaiduryya, Indranîla (Sapphire). 60. Chhâyâ (Transmitted Light). 61. Marakata (Emerald—its origin, and good and bad effects). 62. Pusparâga (Topaz). 63. Bhîsmamaṇi. 64. Pulaka. 65. Sphatika (Quartz). 66. Ayaskânta. 67. Sankha (Conch).

68. Astra (Missile). 69. Khaḍga (Dagger). 70. Dhanu (bow). 71. Bâṇa (arrow). 72-3. Yâtrâ (Expedition)—the proper time for it. 74. Nirâjana (ceremony with horses and elephants).

75-9. Horses—Testing, their defects, how to strike them, etc. 80. Ritucharyya (seasons—and seasonal treatment of horses). 81-2. Elephants. 83-5. The Examination, Merits and Defects of Bulls. 86. Buffaloes. 87. Deer. 88. Dogs. 89. Goats. 90-3. Carriages of various kinds.

94. Naukâ Kâsṭha (woods or timber for boats). 95. Boats of various kinds.

(g) *Hindu Râjneet in Ayeen Akbari.*

The political literature of the Hindus was known to Abul Fazl, who in the *Ayeen Akbari*,[1] has given a short synopsis of probably some of the *Nîti Sâstras* in his possession in the chapter on the various branches of learning cultivated by the people of Hindusthan ruled by his master, the great Akbar. Besides giving an elaborate description of Hindu Laws under the heading *Beyhâr* (*Sans. Vyavahâra*) and referring to "many other sensible books upon government," the compiler of this Moghul Gazetteer gives the following summary of *Râjneet*, " the art of governing a kingdom."

"It is incumbent on a monarch to divest himself of avarice and anger, by following the counsels of wisdom. * * * It is his indispensable duty to fear God * * * to pay particular respect to men of exalted rank and behave with kindness towards his subjects of every description. * * * He should be ambitious to extend his dominions. * * * No enemy is so insignificant as to be beneath his notice. * * * A wise prince will banish from his court all corrupt and designing men. * * *

" The king resembles a gardener, who plucks up the thorns and briers, and throws them on one side, whereby he beautifies his garden, and at the same time raises a fence which preserves his ground from the intrusion of strangers. * * * The king detaches from the nobles their too numerous friends and dangerous dependents. * * *

In affairs of moment it is not advisable to consult with many. * * * Some ancient monarchs made it a rule to consult men of a contrary description and to act diametrically opposite to their advice. * * * They found it the safest way to join with the prime minister a few wise and experienced men, and to require each to deliver his opinion in writing. A prince moreover requires a learned astrologer and a skilful physician. * * * If any monarch is more powerful than himself he continually strives to sow dissension among his troops; and if he is not able to effect this, prudently purchases his friendship. * * * The prince whose territory adjoins to his, although he may be friendly in appearance, yet ought not to be trusted; he should always be prepared to oppose any sudden attack from that quarter. With him whose country lies next beyond the one last-mentioned he should enter into alliance; but no connexion should be formed with those who are more remote. If he finds it necessary to attack his enemy, he should invade his country during the time of harvest."

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[1] Gladwin's Translation, Vol. III (1786) pp. 194-213.

Here we have from a foreign source the traditional ideas of the Hindus regarding Constitution, International Morality, etc., as preserved in the Hindu literature of the 16th century A. D.

SECTION 4.

Unity and Diversity in Indian National Life.

There are, no doubt, some floating ideas which are common to almost all these treatises and seem to have been the stock-in-trade of every writer on *Niti*. These verbatim reproductions or occasional modifications and adaptations of the same texts are not difficult to explain. The language of the learned world was the same throughout India. Education was imparted orally, and ideas were transmitted for generations from mouth to mouth. Besides, the incessant political changes of the times also promoted a uniformity of culture. Dynastic revolutions, territorial expansion and contraction, transfers of royal seats from place to place, emergence of new areas into political importance, constant transformations of the " old order yielding place to new "—all these tended to produce an elasticity and flexibility of the Indian mind ever ready to receive new impressions by facilitating *rapprochement* and intercourse among the people.

But beneath these unities and uniformities of culture are to be found the varieties and diversities which are the characteristic products of particular epochs and areas. A close study of the political maxims embodied in the various branches of Hindu literature is calculated to yield not only a history of the *development* of polity and political speculation in India, through the ages, but also a record of the varying geographical influences bearing upon it.

This characteristic of Indian national culture in its socio-political aspects, *viz.*, the super-imposition, upon a fundamental bed-rock of uniformity, of a diversity adjusted to the conditions of varying localities and relative to the changes in the dynamic world-forces—has been also pointed out in my papers on a socio-religious festival called *Gambhirâ* connected with the *Śaiva-*

cum-Śâktaism of Bengal.[1] In fact, "the diversity that characterises the customs and festivals, hymns and rituals of the people in different parts of India in the self-same socio-religious institution is so great to-day that it is difficult to perceive the unity underlying them."

The relativity and diversity of national ideals and institutions modifying the traditional unifying agencies have been thus explained: "The kaleidoscopic political changes which shifted the vital centres of gravity from people to people, province to province, and district to district, necessarily converted the border-lands or buffer-states of one epoch into prominent seats of political and cultural life in the next, and occasionally diverted the stream of paramount ideas along new and untrodden channels. These are hardly visible to us to-day because of the paucity of historical details bearing on them. On the other hand, the translation of higher culture into the tongues of the people of the various parts from the common storehouse of Sanskrit, the *lingua franca* of educated India, through the ages, and the necessary modifications or adaptations, have imparted a local colouring and distinctive tone to the all-India Hindu traditions, sentiments and customs in the several parts of the country."

"Social and religious life of the people of India have thus been for ages governed not simply by the texts of the Sâstras in Sanskrit (which, by the bye, could not escape the natural adaptation to the conditions of time and place), but also really and to a powerful extent by the vast mass of different vernacular literatures, both secular and religious, that grew up side by side with, and eventually replaced, to a considerable extent, the original storehouse."

Section 5.

Preliminary Spade-work.

So far as the Hindu Literature on Economics, Public Finance, Constitution, Jurisprudence, and International Law is concerned, the proper analysis of the documents with the object of discriminating from the permanent and basic foundations of unifying thought and tradition the layers and sediments that point to different epochs and diverse local conditions in Indian culture-history, has yet to be undertaken.

And the problem of assigning a particular political code to a particular kingdom or empire cannot be solved before a vast amount of spade-work is done. In the first place, the political history of India has to be ransacked so as to give more or less complete pictures of the administrative machinery and economic organisation of the various kingdoms and empires of the Hindu world. Mr. Krishnaswamy Aiyangar has given a good survey of the whole administrative system of the Cholas[2] (900-1300, A.D.) in his *Ancient India* by utilising inscriptions and Tamil manuscripts. Mr. Akshaya Kumar Maitra has thrown out some suggestive hints regarding the Land Revenue Policy and agricultural tenures under the Pâla Empire. The materials in the possession of the Vârendra Research Society are likely to yield a more satisfactory and complete picture of the mediæval administrative. system in Eastern India.

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[1] A *Northern Form of the Śaiva Cult* in the *Modern World* (Madras) for October 1918.

[2] See also *Polity Ancient and Mediæval in Kerala*—(Modern Review, December 1918) by Venkataraya Iyer.

In the second place, the whole field of Indian Literature, both Sanskrit and Vernacular, has to be ransacked wide and deep to discover socio-political and socio-economic treatises, and their contents minutely analysed and elaborately indexed in the interest of comparative studies. Mr. Narendranath Law's *Studies in Ancient Hindu Polity* has revealed certain features of Maurya administration described in the *Arthasâstra* of Kautilya. Mr. Kashi Prasad Jayaswal's essay on the *Introduction to Hindu Polity* published in the columns of the *Modern Review*, is a historical survey of Hindu political thought. Though premature as such, it is well calculated to suggest and open up new fields for the careful consideration of those who are interested in the theory of political progress and development of politics and in the history of political science as a special branch of world's philosophical literature.

The present work is an attempt at placing some of the data of socio-economic and socio-political life gleaned from a text-book of Hindu Sociology.

CHAPTER II.

THE DATA OF ANCIENT INDIAN GEOGRAPHY.

SECTION I.

Sukranîti as a source of Geographical Information.

The work of Sukrâchâryya is not a historical *kâvya* like the *Râj Tarangiṇi* or 'Annals of Kashmir' in Sanskrit by the poet-historian Kalhana, which, according to Mr. Stein,[1] "is not only the amplest but also the most authentic of our sources for the geography of Kashmir," and 'by far the richest source of information' for its historical geography. It is not an *Itihâsa*,[2] 'which narrates past events in and through the stories of the actions of the kings.' The description of courts and palaces, forts and temples, or of the circumstances attending the foundation of towns, villages, estates, shrines, mathas and other religious structures by particular kings, or the narrative of expeditions, warfares, sieges, etc., undertaken in quest of territorial expansion are quite uncalled for in the *Nitisâstra*. Here the author has no opportunities for describing the physical background of the hero's exploits by referring to the relief, mountains, rivers, character of soils, seasons, weather, climate and such other natural agencies as promote or retard the activities of man. It is not even a *Purâna*[3] also, which according to the orthodox definition must contain "an account of the creation, the destruction, the dynasties, the cycles or epochs and the incidents or events under each dynasty." There is thus no scope in it for popular story-telling and attractive descriptions likely to catch one's imagination or for rambling from subject to subject and charming digressions about the plants, animals, physical features, geological facts, etc., that come in the way. Nor is *Sukranîti* an ordinary *kâvya*[4] like, say, the *Raghuvamsam* of Kâlidâsa, which must "appeal to the various *rasas*, *i e.*, feelings or tastes and give rise to pleasure" according to canons of Hindu literary art, and may be diversified in style by images, similes, metaphors and other forms of *alamkâra* or figures of speech, as well as enriched by historical narratives or matter-of-fact descriptions, fanciful pictures or details of men and things according to the writer's genius and sense of proportion. But *Sukranîti* is in verse only because almost every bit of Sanskrit literature is so; there is here no scope for flights of imagination or embellishments of style.

The physiography, topography, mineralogy and meteorology of a place that are more or less expected in works like these have no natural place in a *Nitisâstra*. Among the thirty-two *vidyâs* or sciences mentioned by Sukrâchâryya in the third section of the fourth chapter of his work, there is no mention of *Nîtisâstra.* But the scope he has defined for his Sâstra at the commencement of the treatise and the manner in which he accomplishes his task lead one to believe that *Nîtisâstra* is either identical with, or a species of, the more generic *vîdyâ*, the science of *Arthasâstra*,[1] which is defined to be that "which describes the actions and administration of Kings in accordance with the dictates of Sruti and Smriti, as well as the means of livelihood in a proper manner," and is thus politics and economics combined. It is what in modern phraseology would be called a 'normative' science dealing with what 'should be' as opposed to what 'is' or 'has been,' since it dictates and prescribes 'duties' for kings, princes and statesmen. In such a work we cannot expect anything but the 'generalisations,' or what appear to be generalisations, regarding kingly functions deduced from the experience of many states in the past and the present; and therefore references to particular or individual men and places are few and far between, incidentally called for in the interest of illustration.

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[1] Stein's Râj Tarangiṇi, vol. 2, p. 366.

[2] Sukra IV, iii, 104-5.

[3] Sukra IV, iii, 102-3.

[4] Sukra IV, iii, 110-1.

The very scope and nature of *Sukraniti*, therefore, prevent it from being a source of geographical information, and the author or authors of the work have conscientiously done their part by avoiding all unnecessary or superfluous details except such as are directly and indirectly relevant to the socio-economic and socio-political topics. In studying the geographical environment of the locality in which the work was composed or the court was situated one has, therefore, to pursue the same method as is used in the study of Shakespeare, who always hides himself and eludes the reader's grasp. It seems almost a hopeless task to catch the personality of Shakespeare or Kâlidâsa, because in them there is 'Nature's plenty.' It is an interesting fact about Kâlidâsa that to-day he is claimed by all the four quarters of India as belonging to each. Kashmir and Malabar, Guzarat and Bengal, the extreme north and the extreme south, the extreme west and the extreme east—all vie with each other in finding from the 'internal evidences' of the works of Kâlidâsa that they are the products of a man born and bred in their surroundings.

The geographical facts and phenomena in *Sukraniti* have to be studied, therefore, not only to fix upon the locality in which it might have been written, but also for the knowledge that the poets of the Sukra cycle or authors who chose to adopt the *nom-de-plume* of Sukrâchâryya have incidentally displayed regarding the plants, animals, minerals, rivers, forests, soils, seasons, &c. of India and the world outside it.

SECTION 2.

General Geographical Facts.

(*a*) *The Quarters and Divisions of India.*

The directions of the world, as indicated by the points of the compass, have been mentioned several times in the course of the work. In connection with the construction of the capital city[2] and the royal residence or palace and officers' quarters, &c., Sukraniti is very particular about the directions, northern or southern, eastern or western, that are to be specially set apart for particular rooms or houses. Thus towards the east the king should have houses for the washing and cleaning of clothes &c. The northern rooms are set apart for chariots, arms and weapons, &c. The museum is to be situated towards the north of the palace. And so on. Or again the northern and southern sides are to be long, twice or thrice the eastern and western sides. The palace is to have sides of equal length in all directions and to be high southwards and low northwards. The rooms of the rest-houses may face the north or east. In *Vâstu-Sâstras*, or Hindu treatises on buildings, the directions must be mentioned with particular care, because each is supposed to be presided over by a deity, (*e.g.*, Kuvera, or the god of fortune, is the lord of the north, Yama or Death is the lord of the south, and so on). Hence, each direction has a special value affixed to it over and above the ordinary secular significance which arises from the fact that human life and comfort are affected by the sun, the wind and other natural agencies. The subject has been elaborately treated in that celebrated mine of information regarding things Indian, called the *Brihat Samhitâ* as well as the socio-economic manuscript, *Yukti Kalpataru.*

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[1] Sukra IV, iii., 119-20.

[2] Sukra I, 425-515.

Besides this mention of directions which, according to Hindu tradition, is mainly of a social and religious character, *Sukraniti* contains references to the north, south, east, west and middle as points or regions which take the reader out of the purely local surroundings of a particular spot. The geographical horizon of the poets of the Sukra cycle can be inferred to a certain extent from one of the functions of the *Sachiva*[1] or Head of the War Office, among the Ten *Prakritis* or Executive Councillors of the state, which is described to be that of studying the men who are sent eastward and westward on missions. This mention of 'eastward and westward,' however, does not furnish any solid ground as to the particular regions meant, for it has been done in connexion with a general statement. But the references to the 'north and west' as the land of the Yavanas[2] who "recognise authority other than that of the Vedas," to the 'southern' countries where Brahmanas[3] are not condemned, if they marry maternal uncles' daughters, to 'Madhyadesa,' where artisans[4] are beef-eaters, and deviation from the normal customs is not regarded as a sin, and to the 'north'[5] where the women are touchable when they are menstruated, are not only the facts of pure and simple geography, but create in the minds of the reader the shrewd suspicion that the author of these lines does not belong to the particular regions mentioned, and that these must lie beyond the pale of "normal" rules and regulations of social life. In fixing upon the author's home, therefore, one would be naturally tempted to exclude these regions from one's considerations.

It is difficult to make out which regions are specified in these references. The description of India as a country of the *Navakhanda*[6] or Nine Divisions was first used by the astronomers Parâsara and Varâhamihira, and was afterwards adopted by the authors of several of the Purânas. "The names of the Nine Divisions given in the Mahâbhârata and the Purânas differ entirely from those of Varâhamihira; but they agree with those of the famous astronomer, Bhâskarâchâryya." But "the division of India into five great provinces would appear to have been the most popular one during the early centuries of the Christian era, as it was adopted by the Chinese pilgrims, and from them by all Chinese writers. According to Vishnu Purâna the *centre* was occupied by the Kurus and Panchâlas; in the *East* was Kâmarupa or Assam; in the *South* were the Pundras, Kalingas, and Magadhas; in the *West* were the Saurâstras, Suras, Âbhiras, Arbudas, Karushas, Mâlavas, Sauviras, and Saindhavas; and in the *North* the Hunas, Salvas, Sakalas, Ramas, Ambashtas and Pârasikas." This account of India in the Vishnu Purâna does not include what are comprised by the modern Deccan and Southern India. But "the same division of five great provinces was adopted by the Chinese pilgrim Houen Tsang in the seventh century, who names them in the same manner, as north, south, east, west and central according to their relative positions." The extent and area of each of the five great provinces which according to the tourist's report contained altogether eighty kingdoms are not the same as those in the Vishnu Purâṇa; and Houen Tsang's India is larger than that of the Purâṇa. From Cunningham we quote the following lines which give the territories included within the five great provinces of India in the seventh century A.D.

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[1] Sukra II, 181-190.

[2] Sukra IV, iv, 74-75.

[3] Sukra IV, v, 94.

[4] Sukra IV, v, 25-96.

[5] Sukra IV, 5, 97.

[6] Cunningham's *Ancient Geography* of *India* (1871), pp. 5-8.

"I. *Northern India* comprised the Punjab Proper, including Kashmir and adjoining hill states with the whole of Eastern Afghanistan beyond the Indus, and the present cis-Sutlej states to the west of the Saraswati river. 5438

II. *Western India* comprised Sindh and Western Rajputana with Kutch and Gujarat, and a portion of the adjoining coast on the lower course of the Narbada river.

III. *Central India* comprised the whole of the Gangetic Provinces from Thaneswar to the head of the Delta and from the Himalaya mountains to the banks of the Narbada.

IV. *Eastern India* comprised Assam and Bengal Proper including the whole of the Delta of the Ganges together with Sambalpur, Orissa and Ganjam.

V. *Southern India* comprised the whole of the Peninsula from Nasika on the west and Ganjam on the east, to cape Kumari (Comorin) on the south, including the Modern Districts of Berar and Telingana, Mahârâshtra and the Konkan, with the separate states of Haidarabad, Mysore and Travancore or very nearly the whole of the Peninsula to the south of the Narbada and Mahânadi rivers."

Mr. Cunningham believes that the tradition of the five Great Provinces was very popular in ancient India, at any rate among the educated classes. And if the authors of the Sukra cycle followed that tradition in referring to the land of Yavanas and the other regions of customs that would be regarded as immoral and heinous according to the normal standard of life and manners obtaining in the country for which their work was being written, the treatise excludes practically the whole of India from its purview and would have to be referred to some spot in *Eastern India*. But is it probable that the authors have used the *pratyaguttara*, (north and west or north-west ?), the *madhyadeśa*, the *dâkṣiṇâtya* and the *uttara* in the technical sense of the terms as given in either Vishnu Purâna or the Chinese pilgrim's accounts? The question involves larger issues and cannot be decided before the following problems are solved :—

(1) The Ethnology of the Yavanas and their Philosophy.

(2) The regions and races which allowed beef-eating to artisans and artists and fish-eating to men.

(3) The regions and races which allowed the marriage of maternal uncles' daughters by Brahmaṇas.

(4) The regions and races which did not consider female menstruation as a pollution.

(5) The regions and races which did not object to the drinking of wines by women.

(6) The regions and races in which unchastity was not regarded as a sin.

YAVANAS.

If we are to determine the geography of the Yavanas after solving the question of their race and religion, the problem will not be solved at all. The *Yavanamata*[1] or the philosophy of the Yavanas has been described in *Sukraniti* as the thirty-first *Vidyâ* "which recognises God as the invisible creator of this Universe and recognises virtues and vices without reference to *Sruti* and *Smriti*, and which believes that *Sruti* contains a separate religious system." This description of Yavanism as a non-vedic, monotheistic religion is 'too wide', and as Mr. Oppert discusses in his short Preface to the Text of *Sukranîti Sâra*, published by the Madras Government in 1882, may be made to apply (1) to the Mosaic religion, (2) to Mahometanism, (3) to Christianity, (4) to the religion of the ancient Persians ; and even (5) to the religion of the Hindus "who contend that they only revere the god-head in one particular manifestation, but that they do not admit of a plurality of gods." But Mr. Oppert's contention that *Yavanamata* may refer even to Hinduism is certainly erroneous, since no form of Hinduism ignores *Sruti* and *Smriti* and believes that Sruti contains a separate religious system—conditions essential to Yavana philosophy. In any case, to argue definitely from the tenets and doctrines of this creed as to the race and nationality of the people professing it is impossible.

As for the abode or habitat of this race it is mentioned that the people are 'pratyaguttaravâsinah.'[2] This word may be interpreted in two ways according as the compound is taken to be of the *Karmadhâraya* type or of the *Dwandwa* type. In the first case, the Yavanas are a people who live in the north-west. In the second case, they live *both* in the north and in the west (*pratyak*). Mr. Oppert takes it in the first sense. I take it in the second. But either way we are not left any the wiser regarding the religion or the people indicated by the term. For in different ages different peoples professing different faiths, Jewish, Hellenic, Christian, and Mahometan, have been inhabitants of the regions implied by the north, west, and north-west. The pre-condition for fixing the precise ethnology of Yavanas, therefore, is the exact date of *Sukraniti*, which for a long time yet, is sure to be ' begging the question.'

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[1] Sukra IV, ii, 124-126.

[2] Sukra IV, v, 74-75.

Dr. Râjendralâl Mitra, in his second volume of *Indo-Aryans* after a protracted disquisition, arrives at the following conclusions regarding the Yavanas:

> " That originally the term Yavana was the name of a country and of its people to the west of Kandahar,—which may have been Arabia, or Persia or Medea, or Assyria—probably the last.
>
> (2) That subsequently it became the name of all those places.
>
> (3) That at a later date it indicated all the casteless races to the west of the Indus including the Arabs and the Asiatic Greeks and the Egyptians.
>
> (4) That the Indo-Greek Kings of Afghanistan were also probably indicated by the same name.
>
> (5) That there is not a tittle of evidence to show that it was at any one time the exclusive name of the Greeks.
>
> (6) That it is impossible now to infer from the use of the term Yavana the exact nationality indicated in Sanskrit works."

BEEF AND FISH.

If the above discussion does not leave us on any solid ground as to the geographical facts and phenomena of India, the precise delimitation of areas within which certain abnormal social and religious customs are allowed is none the more easy. Take, for instance, beef-eating, which has been described as the peculiar custom of the artists and artisans of the *madhyadeśa*, or fish-eating, which is described as the special characteristic of the people generally of the same tract. Both in Vedic and subsequent Indian literature the slaughter of animals for food has been repeatedly mentioned. Principal P. T. Srinivas Iyengar writes in his *Life in Ancient India in the Age of the Mantras :*

> " Horses (A.V.vi. 71.1), bulls (R.V. i. 164. 43), buffaloes (R.V. 29. 7), rams (R.V. X.27. 17) and goats (R.V. i. 162. 3) were killed on slaughter-benches (R.V.x.86.18), cooked in caldrons (R.V.iii. 53.22) and eaten. The eating of fishes and birds must have also prevailed."

Dr. R. Mitra also is strongly of opinion that beef-eating was universally allowed in ancient India and proves it by referring to *Uttarâma-charita, Smrîtis, Manusamhitâ, Asoka's edicts, Mahâbhârata, Râmâyaṇa, Charaka, Suśruta, Kalpa and Grihya Sutras.*

> " Âswalâyana emphatically ordains that no *madhuparka* should be celebrated without flesh (?)." The author of the *Nârasinhiya Prayoga-pârijàta* has copied verbatim Âswalâyana's rule about the necessity of eating beef at the Madhuparka ceremony, but qualified it by a quotation from *Âdityapurâna* which says that in the present *kali* age the madhuparka should be celebrated without slaughtering a cow. The quotation has been given at length by Parâsara, Hemâdri and other compilers." " The Brihannâradiya Purâna follows the above very closely."

Both the *Upa-purânas* are, according to Dr. Mitra, not above eleven or twelve hundred years old. The author of the *Nirṇayasindhu* argues :

> " The slaughter of large bulls and large sheep for Brahmans versed in the Vedas, though duly ordained, should not be done, being detested by the public."

Dr. Mitra's explanation[1] of the prohibition of beef-eating lies in the fact "that when the Brahmans had to contend against Buddhism, which emphatically and so successfully denounced all sacrifices, they found the doctrine of respect for animal life too strong and popular to be overcome, and therefore gradually and imperceptibly adopted it in such a manner as to make it appear a part of their *Sâstra.*"

The lines in Sukranîti, therefore, referring to the custom of beef-eating as confined within a certain class of people in certain tracts of India called ***madhyadeśa*** must have been written by a person, if Dr. Mitra's theory is to be accepted, who lived in an environment that had long been disciplined in the sentiments and traditions brought on by the ascendancy of Buddhism. Madhyadeśa, therefore, should mean the land that forsook these humanitarian ideals long before other parts had become callous to them. Eastern India[2] as described in connexion with Hiouen Tsang's travels was the land that received Buddhistic influence earlier and more powerfully than other parts of India, and it may be surmised that the author of the lines referred to was writing from his home in Eastern India about the *Central India* as described in the Chinese itinerary, when he was thinking of beef and fish as food.

Mahâmahopâdhyâya Haraprasâd Sâstri, in his Introduction to Mr. Nagendra Nath Vasu's *Modern Buddhism,* thus bears testimony to the strength of Buddhism in Eastern India :

> " Yuan Chuang tells us that there were ten thousand Sanghârâmas with a hundred thousand Bhikshus in Bengal. To support this vast mendicant population at least ten millions of lay families were required, and they would be all Buddhists. * * More than three-fourths of the population of Bengal were Buddhists. Full one hundred years after Yuan Chuang, the original five progenitors of the present Râdhiya and Vârendra Brâhmans in Bengal came from Kanoj. Their religion was not a proselytising one. In the middle of the twelfth century Ballâla Sen took a census of the descendants of these five Brahmins and he found only eight hundred families in all. They lived mostly on grants of land made to them by the Râjâs. * * * But they rarely interfered with other people's religion. * * * The masses were almost entirely left in the hands of the Buddhists, both married and unmarried. * * * The monasteries of Nâlanda, Vikramaśilâ, Jagaddala and other places were the best seminaries for the diffusion of Buddhistic learning and Buddhistic religion. It was from these monasteries that Tibet, Burma, Ceylon and Mongolia received their Buddhist preachers and Buddhist authors and translators. * * * In the twelfth century there were the following forms of religion in Bengal and in Eastern India :—
>
> 1. Brahminism. It was followed by 800 families of Râdhiya and Vârendra Brahmins and about a hundred families of other Brahmins, the descendants of many Kâyasthas who came from the west and those of lower classes who served the families.

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[1] Indo-Aryans, Vol.II, pp. 354-88.

[2] See the contributions of Mahâmahopâdhyâya Haraprasâd Sâstri to the Journal of the Asiatic Society of Bengal, No 1. 1895, and Proceedings of the Society for December, 1898. Pandit Sastri has explained " *how the religion which existed in Eastern India in such splendour from 600 B. C. to 1200 A. D.*" has under the influence of new conditions continued to exist there in new names under various guises even to the present day. This latter aspect of the question has been discussed by Mr. Nagendranath Vasu also in his *Modern Buddhism.*

2. **Hinayâna.** This was followed on the West of the Ganges and especially in Tamluk.

3. **Mahâyâna.** It was a religion of the higher class Buddhist monks and higher class Buddhist laity.

4. **Vajrâyana.** This was the religion of the middle class man and the married Buddhist clergy.

5. **Nâthism,** which was professed by the Yogis who had numerous followers amongst the Buddhists and a few among the Brahminists.

6. **The Sahajiyâ cult.** It had numerous followers below the middle-class Buddhists and some among the lower class Brahminists.

7. **Tântrism.** It had its followers among all classes, but among the higher classes it was a subsidiary form of worship, among the lower it was the chief form.

8. **The Kâlachakrâyana.** It was purely Buddhist and more a religion of fear than of love and was followed by the lowest classes."

Mr. Dineschandra Sen, also, in his celebrated *History of Bengali Literature* (both in Bengali and English) has adduced fresh facts in support of the Sastri's theory about the survival of Buddhism among the lower orders in Eastern India. He has referred to Bengali works of the period from 13th century, the age of the so-called annihilation of Buddhists by the Musalmans, to the 17th century. Nagendranath Vasu's *Modern Buddhism* is an account of still extant forms of that cult in the hill-tracts of Orissa. In Mr. Sen's monumental work we have been supplied with some of the more important features of Buddhistic faith that may be detected from an analysis of (1) the *Sunyapurâṇa* of Râmâi Pandit published by the Bangiya Sâhitya Parishat of Calcutta, (2) the Bengali passages occurring in the Sanskrit works of 10th-11th cent., (3) the *Charyâ charyavinischaya* of Kânu Bhatta, discovered by the Sastri in Nepal, (4) the Lay of Mânikchând published in the Journal of the Asiatic Society of Bengal (belonging according to Grierson, to the 14th, but according to Sen, to 11th-12th cent.), (5) the folk-songs about Govinda Chandra compiled by a rustic poet, (6) the agricultural maxims of Khanâ, and (7) astrological lore of Dâka, both of which must be considerably anterior to Mânikchând.

Another scholarly and highly original Bengali publication of recent times which throws a flood of light on Mediæval Buddhism and the processes of transformation by which it merged into, and was replaced or considerably eclipsed by, Hinduism is the history of *Gambhirâ*,[1] a Śaiva festival of the people in North Bengal, by Mr. Haridâsa Pâlit of the District Council of National Education, Malda. This work may be looked upon more or less as a connected history of socio-religious life of Eastern India. The researches embodied in it go further than supplying new data corroborating the hypothesis of the Sastri; for it proves that the worship of Śiva by the orthodox Hindus of to-day with such peculiar constitutional, doctrinal and devotional features as are associated with the *Gambhirâ*, *Gâjana* and other ceremonies, is nothing different from, but really a descendant or another form of, the worship of Dharma, the mediæval Buddha, popularised by Râmâi Pandit, and that the whole laboratory of Buddhalogy and paraphernalia of Buddhistic ceremonialism have been utilised by and transformed into the modern socio-religious institutions of the Hindus. Modern Śaiva-cum-Śâktaism is thus traced by the author through the Yoga-Tantric phase of Mahâyâna-cum-Brâhmanism back to the Vedic period of the simple worship of Rudra, Rudra-agnis, &c.

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[1] The materials supplied by Mr. Pâlit in this learned work from a first-hand study of innumerable Bengali and Sanskrit Mss., traditions and folksongs as prevailing in North and West Bengal (called *Varendra* and *Râdha*) as well as Orissa have been utilised by the present author for his forthcoming work, "Studies in Hindu Literature—Literary and Sociological." A few chapters from this have been published in *The Vedic Magazine* (Hardwar), *The Modern World* (Madras), and *The Collegian* (Calcutta).

That Buddhism was decaying in Central and Southern India, while it flourished vigorously in Bihar and Bengal, would be evident from the following extracts from Mr. Vincent Smith's *Early History of India* :

> "The Brahmanical reaction against Buddhism had begun at a time considerably earlier than that of Fâhien's[1] travels (405—11 A. D.); and Indian Buddhism was already upon the downward path."
>
> "Buddhism was visibly waning in the days of Harsha and Houen Tsang. * * * It had certainly lost its dominant position in the Gangetic plain which it had once held. * * * The sacrificial form of the Hindu religion received special attention. * * * Buddhism as a popular religion in Bihar, its last abode in Upper India, south of the Himalayas, was destroyed once and for all by the sword of a single Mussalman adventurer (1193 A. D.)."

According to Dr. Mitra, therefore, the prohibition of beef and meat as food and the consideration of people taking to them as following an abnormal practice must be ascribed to the influence of Buddhistic environment in Eastern India as I have suggested above.

MATERNAL UNCLE'S DAUGHTER.

The marriage and other social customs mentioned above do not raise many difficulties. Among Marathas and Madrasis, even to-day, Brahmans may marry maternal uncle's daughters—an abnormal custom according to Sukra. The tradition is preserved in a familiar Sanskrit sloka 'dakṣiṇe mâtulî-kanyâ, uttare mânsabhojanam,' which describes the southern custom regarding marriage together with the northern regarding meat as food. The term Dâkṣiṇâtya, therefore, used in the *Sukraniti*, for the abode of such Brahmans as follow this abnormal custom, refers both to what is now called the Deccan plateau as well as Southern India, as it did according to the division of India into five great provinces in Houen Tsang's time. There is no doubt that by this term the Northerner (or East Indian ?) Sukra refers to the Deccani (Châlukya, Râṣtrakuta), Andhra (Telugu) and Chola (Tamil) Brahmans of his age.

WINES.

As for what Sukrâchâryya considers to be the abnormal practice of the drinking of wines by females, definite information on the point is not easily available. Dr. Mitra has proved the practice to be universal by references to the Râmâyaṇa, Mahâbhârata, Buddhist works, the works of Kâlidâsa and Mâgha,

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[1] **Second Edition, pp. 283, 287, 318, 370. See also Aiyangar's *Ancient India*, p. 362.**

Purânas and Tantras. But the fact that it should be regarded as exclusively the practice of the female sex of a particular country cannot be satisfactorily explained in the present state of our knowledge regarding the social life of ancient and mediæval India. Sukra may, therefore, be taken at his word when he mentions the north as the locality of the custom. And there is no objection to referring this north to the northern division of Hiouen Tsang.

The same arguments apply to the non-observance of menstruation as ceremonially unclean, and yield the same conclusions about its locality.

UNCHASTITY.

The unchastity of women[1] has been referred to several times in Vedic and other Hindu literature. But it is not easy to locate it somewhere as the area in which it is particularly connived at. Sukra's statement that it is the characteristic of the women of Madhyadeśa may, therefore, be taken for what it is worth. And in the absence of positive evidences for or against, this madhyadeśa may be taken to be the *Central India* of the Chinese pilgrim.

EAST INDIAN LOCALE OF SUKRANITI.

The study of the directions and divisions of India mentioned in the Sukraniti leads to a tentative hypothesis as to the home of the authors of the Sukra cycle. We have to fix upon a region, *with reference to which* the writer may simultaneously mention the north, west, central and south, as the quarters or divisions where certain customs and practices obtain which "deserve penance' and punishment" in the normal region that sets the standard.

No Southerner would regard a southern practice as out of the way and beyond the ' norm.' The same consideration applies to the westerner, northerner, &c. The only region or quarter that has *not* been mentioned must therefore be the land of Sukra's ' normal ' social life, and this is the Eastern.

The argument from the ' abnormal ' practices leaves no doubt as to the normal region in which the treatise was composed. As to the spot also with reference to which the quarters of India and the positions of the regions are mentioned, there can be no difficulty. We may place it in Eastern India, if we suppose that north, west, centre and south were being mentioned in the technical sense of the terms as used by Hiouen Tsang. The Easterner versed in technical terminology would mean by north not the Tibetan Himalayas, but the Punjab and Kashmir, Himalayas, &c., by the west not the modern U. P. but Sindh, Rajputana, &c., by the central the regions marked out by Hiouen Tsang comprising U. P., Behar, C. P. of modern times, and by the south the whole of South India beyond the Narbada. The *Madhya* (centre) would thus always be the centre of India, the North always the North of India, the ***Dâkṣiṇâtya*** or South the whole of Southern India.

But one might argue that, if the technical meaning of the terms be taken, there can be no objection to the author of the lines referred to being a southerner also, say a Chola or an Andhra, belonging to any part of India, for he is at liberty to use the terms in the same sense from all places. The objection is refuted by the other consideration about the normal and abnormal customs just discussed. Thus though the Southerner may call the man of the Punjab and Kashmir, &c., northerners in the special sense, and the other parts of India excluding Râjputânâ, &c. on the west and Bengal, &c, on the east by the special name of Central India, and describe himself as a southerner in the technical sense given with reference to the whole of India (which is not likely), it is not at all probable that he would look upon the southerners, or his own countrymen as illustrating a social practice that is beyond the 'norm.' The same consideration goes against the author being a 'north'-man or a 'Madhyadeśa'-man.

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[1] Iyongar's *Life in Ancient India*, pp. 67-68.

[2] Sukra IV, v, 99.

This process of reasoning is adopted by George Buhler[1] to prove that Âpastamba is a southerner. Thus, "Âpastamba says (Dh. II, 7, 17, 17) that the custom of pouring water in the hands of Brahmanas invited to a Srâddha prevails among the northerners, and he indicates thereby that he himself does not belong to the north of India. If this statement is taken together with the above stated facts which tend to show that the Âpastambiyas were and are restricted to the south of India, the most probable interpretation which should be put on it is that Âpastamba declares himself to be a southerner."

(*b*) *Other Lands.*

Whatever be the value of the hypothesis as to the author of *Sukranîti* being an Easterner, as understood by the Chinese pilgrims, and also by the Indians of the early Christian era, one thing is clear. The geographical knowledge displayed by Sukrâchâryya is not confined to a particular area. The poets of the Sukra cycle are not home-bred men, their intellectual horizon covers the whole of India. They can think at once of the four quarters of the motherland, even though conventionally. This has been apparent from the discussion in the preceding sub-section.

That they were cognisant of 'new men, strange faces, other minds' and did not think exclusively of the local area that was the scene of their activities would be indicated by several passages in the Sukraniti, which mention, though indefinitely, regions, religions and languages other than their own. Thus among the qualifications of the clerk or scribe[2] is mentioned that of "knowing of the differences in countries and languages." The statement that the system of measurements[3] varies with countries points to the same experience of the writer beyond his own 'country.' The practice of undertaking distant tours is suggested by the advice that "in foreign lands the following six are useful to men—wife without child, good conveyance, the bearer, the guard or guide, the knowledge that can be of use in relieving others' miseries, and an active servant."[4] This practice of travel and life abroad is also indicated by the idea that "the man[5] who is not in a strange land enjoys happiness." The prohibition of foreign travel[1] to Sudra females, except in the company of the husband, similarly points to this. The comfort of living in the home and the discomfort of life and work abroad have been mentioned as factors which influence the soldiery also. Thus alienation of soldiers[2] is brought about by constant life and work in foreign lands." The rule about 'travelling allowances' is another proof of experiences beyond the little 'platoon.'

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[1] Pp. xxviii-iv. Introduction to *Apastamba and Gautama* in the Sacred Books of the East Series.

[2] Sukra II, 347-348 ; IV, 81-82.

[3] Sukra II, 777-778.

[4] Sukra III, 595-597.

Sukra III, 647.

These references, however, do not furnish any geographical information worthy of note. Nor do they point to anything like an all-India sentiment or knowledge or any extra-Indian experience. These are but vague and indefinite hints about things that are not purely local.

(*c*) *Definite Names.*

It has been mentioned above that as sources of positive geographical information, *Nītisāstras* are not very valuable. This is sufficiently borne out by the fact that only the following five names occur in *Sukraniti*, a work of 4966 lines: (1) Simhala or Ceylon, (2) Gandaka, (3) Dākṣiṇātya, (4) Madhyadeśa, (5) Khaśa.

i. *Simhala*

Ceylon[3] has been mentioned as an island, and its people are described as expert in making artificial pearls which should be carefully examined by customers before purchase. The connexion of Ceylon with general Indian history is immense and has been commercial, political, as well as cultural. Prof. Rādhā Kumud Mookerji[4] has, on the authority of Buddhist texts belonging to a period of a thousand years from 600 B. C, given evidences "which point to a complete navigation of the Bay of Bengal and the Indian Ocean and the flow of a steady and ceaseless traffic between Bengal and Ceylon, Madras and Burma." Mr. S. Krishnaswami Aiyangar of the Mysore Education Service in his *Ancient India*, a scholarly work on the early history of South India, has used old Tamil literature to prove the connexion of the Ceylonese with the Cholas, Cheras and Pāndyas in particular, and Indian culture in general. Mr. Cunningham's account of Ceylon in *the Ancient Geography of India* also throws fresh light on the subject:

> "The famous island of Ceylon is not reckoned amongst the kingdoms of India, and it was not visited by the pilgrim (Houen Tsang) on account of political disturbances. * * * In the seventh century of our era Ceylon was known by the name of *Seng-kia-lo*, or *Sinhala*, which was said to be derived from the lion-descended *Sinhala*, whose son Vijaya is fabled to have conquered the island on the very day of Buddha's death in B. C. 543. Its original name was *Paochu*, or "Isle of Gems," in Sanskrit *Ratnadwipa*."

ii. *Gandaka.*

The Gandaka[5] has been mentioned as a source of gems which may be regarded as natural images. The neighbourhood of the Gandaka is famous in

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[1] Sukra IV, 9-10. [2] Sukra IV, vii, 366-367. [3] Sukra IV, ii, 124.

[4] A History of Indian Shipping and Maritime Activity of the Indians (Longmans, 1912), pp. 29, 30, 34, 42, 44, 67, 70, 103, 113, 133, 140, 142, &c.

[5] Sukra, IV, iv, 507-308.

Buddhist history as it contains the environs of Kusinagara, the scene of Buddha's death. At the time of Houen Tsang's visit the walls of Kusinagara were in ruins. According to Cunningham the spot where Buddha obtained *Nirvâṇa* "lies to the north-west of Anrudhwa, and to the west of the old channel of the Chota Gandaka[1] or *Hiraṇyavati* (golden) river;" and "the spot where his body was burned" lies to the north-east of Anrudhwa and to the east of the old channel of the *Hirana* or Chota Gandaka." We must look for *Vaisâli* to the East of the Gandaka." The position of the Gandaka may be inferred from the following description:[2] "The utmost limit that can be assigned to the joint districts (Vaisâli) is not more than 750 or 800 miles in circuit from the foot of the mountains to the Ganges on the south, and from the Gandaka on the west to the Mahanadi[3] on the east." "According to Houen Tsang the country of the Vrijis was long from east to west and narrow from north to south. This description corresponds exactly with the tract of the country lying between the Gandaka and Mâhanadi rivers, which is 300 miles in length and 100 miles in breadth."

It is possible to trace the tradition of gems being found in the bed of the Gandaka to literary[4] sources. Perhaps the name of the river as *Hiran* and *Hiraṇyavati*, which means golden, may have something to do with it. Small pieces of stone which are worshipped as Viṣṇu are still found in the bed of the Gandaka, and they are highly appreciated. 54[illegible]

The following is taken from the note on page 3 of *Ethnographic Notes in Southern India* by Edgar Thurston, Superintendent, Madras Government Museum: "The Sâlagrâma stone is a fossil ammonite, found in certain rivers, *e.g.*, Gandaka, Son, &c., which is worshipped by Brahmans. The Sâlagrâma is often adopted as the representative of some god, and the worship of any god[5] may be performed before it."

The following is taken from Mr. Nandalal Dey's *Geographical Dictionary of Ancient and Mediæval India*:[6] "The Gandak rises in the Sapta Gandaki or Dhawalagiri range of the Himalaya which is the southern boundary of Central Tibet, and enters the plains at a spot called Tribeni Ghat. The source of the river is not far from Sâlagrâma, which was the hermitage of Bharata and Pulaha. The temple of Muktinâtha (an image of Nârâyana) is on the south of Sâlagrâma. Hence the river is called also Sâlagrâmi and Nârâyaṇi (*Brahmavaivartta Purâṇa*)."

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[1] Ancient Geography of India (1871), p. 432 Kushinagara has been recently discovered by Pandit Hirânanda of the Lucknow Museum at the village called Cassia in the district of Gorakhpur, U. P.

[2] Cunningham's *Ancient Geography*, pp. 444, 448.

[3] The Mahânadi is the modern Mahânandâ flowing through the district oi Malda which contains the sites of ancient Gauda and Pandua, and not the Mahânadi of Orissa.

[4] Devi Bhâgavata IX, 17, 30-36, IX, 19, 87-91, IX, 23, 23-38, IX, 24, 56-58.

[5] See the names and forms of the deities on pp. 348-349 of Oppert's *Original Inhabitants*.

[6] Pp. 19-20. (Newman & Co., Calcutta, 1899).

In *The Original Inhabitants of India*[1] by Mr. Gustav Oppert we have a long dissertation on the Sâlagrâma and the Gandaka—with all the literary and religious traditions associated with them. In the *Varâha Purâṇa* Gandaki expresses a wish to become the mother of Viṣṇu, and the same desire is mentioned in the *Lakshmi Nârâyana Samvâda*. The *Padma Purâṇa* contains a story according to which Indra sent the nymph Manjuvâc to disturb the penance of the sage Vedasiras, who cursed her that she might become a river, but kindly altered his decision in so far that she would become the holy river Gandaki in which Viṣṇu would be re-born as the Sâlagrâma stone.

iii. *Dâkṣiṇâtya.*

Dâkṣiṇâtya[2] has been mentioned in *Sukranîti* as the land where Brahmans marry maternal uncles' daughters. This has been discussed previously in connexion with the directions and divisions of India. It may be mentioned here that the term does not describe any one portion of India south of the Vindhyas, *e.g.*, the Bombay Deccan and the Madras Deccan, but the whole peninsula, and comprises all the nine separate kingdoms, exclusive of Ceylon, included in Houen Tsang's Southern India, *i.e.*, "the whole of the peninsula to the south of the Tâpti and Mahânadi rivers, from Nâsik on the west, to Ganjam on the east." What is now known as the Deccan plateau or at any rate, the Bombay section of the Deccan, had in Houen Tsang's time, the special name of *Mahârâṣtra* and could not be described by the term *Dâkṣiṇâtya*. Mahârâṣtra[3] was only one of the kingdoms of the *Dâkṣiṇâtya* or Southern India as described by Houen Tsang, and lay to the south-west of Harṣavardhana's empire, as Ganjam to the south-east.

The following lines from the third section of the *Early History of the Deccan* by Sir Râmkrishna Gopâl Bhândârkâr prove the antiquity of the word *Mahârâṣtra* as a separate name for a particular region of peninsular India :—

> "Whether the name Maharattha or Maharashtra had come into use in the time of Asoka does not appear clear from this, but that it was used in the early centuries of the Christian era admits of little doubt. In some inscriptions in the cave-temples at Bhâjâ, Bodsâ and Kârli which are to be referred to the second century, the male donors are called Maharathi and the female Maharathini......Of the old Prâkrits the principal one was called Maharashtri because we are told it was the language of Mahârâshtra. Varahâmihira also, who lived in the beginning of the sixth century, speaks of Mahârâshtra as a southern country."

In explaining the etymology of the word "Dekkan" and its denotation, the same authority says :

> "The word Dekkhan represents the vernacular pronunciation of the Sanskrit word Dakshina meaning 'Southern' used to designate the portion of the Indian peninsula lying to the south of the Narmadâ. The name more usually met with in Sanskrit works and elsewhere is Dakshinâpatha or "the southern region." That this name was in

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[1] Pp. 337-59 (Archibald Constable and Co., London, 1893).

[2] Sukra IV, v, 94.

[3] Cunningham's *Ancient Geography*, p. 14.

ordinary use in ancient times is shown by the fact that the author of the *Periplus* calls that portion of the country Dakshinabades. * * * Dahshinapatha or Dakshina was the name of the whole peninsula south of the Narmada. Among the countries enumerated in the Mârkandeya, Vâyu, and Matsya Purânas as comprised in Dakshinâpatha are those of the Cholas, Pândyas and Keralas, which were situated in the extreme south of the peninsula and correspond to the modern provinces of Tanjor, Madura and Malabar."

Dâkṣiṇâtya is therefore not identical with Mahârâṣtra, as the popular notion seems to be, in which sense Sir Bhandarkar has taken it for his celebrated *Early History.* A historical account of peninsular India or the Dâkṣiṇâtya has been written from original sources by Mr. Aiyangar in *Ancient India*,[1] from which the following is quoted :

"When Yuwan Chwang (Hiuen Tsang) travelled through the country in A.D. 640 we find India marked out into three clearly defined political divisions. Harshavardhana......ruling over Hindusthan to the frontiers of Assam ; Pulikesin II of the *Mahârâshtra* at Badami with his younger brother at Rajamahendri ; and Narasimhavarman Pallava at Kanchi." "These two dynasties (Châlukya and Pallava) with their capitals respectively at Kanchi and Badami (near Bijapur) continued the struggle for empire and were seen fighting constantly on the Tungabhadra-Krishna frontier."

iv. *Madhyadeśa.*

The probable site of *Madhyadeśa* also has been discussed in connection with the directions and divisions of India. I have taken it in the technical sense of the term as understood in Houen Tsang's time. "It extended from the Sutlej to the head of the Gangetic Delta and from the Himalaya mountains to the Narbada and Mahânadi rivers. It comprised all the richest and most populous districts of India with the single exception of the Gangetic Delta or Bengal proper. Of the seventy[2] separate states of India that existed in the seventh century, no less than thirty-seven, or more than one-half, belonged to central India." Manu Samhitâ, however, defines Madhyadesa to be the land between the Saraswati (that loses itself in the sands) on the west and Allahabad on the east, and between the Himalayas on the north and the Vindhyas on the south. The tract is thus smaller in extent than Houen Tsang's area. But, as previously explained, it is difficult at present to specify the region meant by the authors of the Sukra cycle. It is clear, at any rate, that it cannot denote the land of aboriginal hill-tribes in the Central India of modern times, simply because beef-eating, fish-eating and unchastity have been mentioned as some of the characteristics of its people.

v. *Khaśa.*

Khaśa denotes both country and race in the *Sukranîti.* Khaśa[3] has been mentioned as the country of an abnormal social custom where "people marry the widows of their brothers." Khaśa is an old term in Hindu literature mentioned in Viṣṇu Purâna, Manu Samhitâ, &c. The following extract from Stein's *Râj Tarangiṇi* throws considerable light on this people: "In the South and West (of Kashmir) the adjacent hill-regions were occupied by Khaśas. Their settlements extended as shown by numerous passages in the Chronicle in a wide semicircle from Kastvar in the south-east to the Vitasta valley in the west. The hill states of Rajapuri and Lohara were held by Khasa[1] families; the dynasty of the latter territory succeeded to the rule of Kashmir in the eleventh century. I have shown elsewhere that the Khaśas are identical with the Khakha tribe, to which most of the petty chiefs in the Vitasta valley below Kashmir and in the neighbouring hills belong. We have already seen that the Khakhas have until very recent times worthily maintained the reputation which their forefathers enjoyed as marauders and turbulent hill-men." "Owing to its position on the most direct route to the Punjab, Rajapuri was necessarily often brought into political relations with Kashmir. When Houen Tsang passed through it, the kingdom of Rajapuri was subject to Kashmir. From the tenth century onwards we find the chiefs of Rajapuri as practically independent rulers." Houen Tsang does not give any account of the hill-tribes he passed through.

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[1] P. 224, 43.

[2] Cunningham's *Ancient Geography*, p. 328. The text has "seventy" ; but the number actually described is eighty-two, from which, deducting Persia and Ceylon, the true number of kingdoms is eighty.

[3] Sukra IV, v, 98.

It is, however, not possible to make out the antiquity of the word Khaśa. It may be mentioned in passing that the word occurs in the copper-plate of Nârâyana-Palâ[2] discovered at Bhagalpur recording a gift for the "dispensation of medicines to the sick, and food and shelter to the indigent."

SECTION 3.

General Aspect of the Country.

The physical features or relief of the country described in *Sukranîti* can be understood but vaguely from the incidental references to hills and rivers, seas and islands.

(*a*) *Hills.*

That hills and mountains were some of the familiar sights to the poets of the Sukra cycle would be evident from the simile which compares the stature of an elephant with the peak of a mountain[3] as well as the mention of the fact that when people became miserable through abject poverty they used to leave this world out of despair and have resort to hills.[4]

The strategic importance of hills and mountains was also understood. Thus the site of the capital city is to be not very far from the hills.[5] These are perhaps to be regarded as the store-house of mineral and other resources in normal times, as well as strong defences against foreign aggression in times of danger. That the hills should be made to serve the purpose of ramparts for the capital situated in the plains is clear from the following suggestion of

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[1] Stein's *Râj Tarangiṇi*, Vol. II, pp. 430, 433.

[2] Mitra's *Indo-Aryans*, Vol. II, pp. 267—74. Also *Manu* 10.44. The Khasas have been mentioned by Varâhamihira in *Brihat Samhitâ* (6th Cent. A.D.)

[3] Sukra I, 205-6. [4] Sukra III, 372-74. [5] Sukra I, 425-28

Sukrâchâryya :—"The wall (of the Capital city) should have many strong shrubs and have a system of well-built windows, ***and if a hill is not hard by,***[1] should have a ***pratiprâkâra*** or a second wall but less than itself in height."

Among the various fortresses mentioned in Section vi of Chapter IV there are ***giridurgas***[2] or hill-forts which are described as being on high level and well-supplied with water. These forts[3] are known to be the best of all in point of military efficiency as presenting the greatest amount of difficulties to enemies. Thus "the fort that is protected by ditches only is the lowest of all, and the hill-fort is the best."

It is not probable that the regions for which this ***Nitisâstra*** is intended are mountainous or rocky in any special degree. The hills do not seem to have been the characteristic features of the lands, though they have been mentioned as some of the objects with which people become familiar through travel. "Through travel the numerous religious customs, materials, animals, races of men, hills,[4] etc. come within the cognisance of man."

(*b*) *Rivers.*

The country of the poets of the Sukra cycle is not only a land of hills but it is also a land of rivers. The suggestion that the capital should be built at a place that is bestirred by the movements of boats[5] indicates the importance given to rivers by Sukra in his description of an ideal economico-political organisation. That the authors were very familiar with rivers would be evident from the political application that naturally suggested itself to them in the matter of diplomatic relations. Thus in advising rulers to bow down to powerful enemies Sukrâchâryya illustrates his point by the mention of the fact that the 'cloud never moves against the current of the wind' and that 'the rivers[6] never leave the downward course.' A common natural phenomenon has been here pressed into service to explain what in terms of modern statesmanship would be called 'moving along the line of least resistance.' So also in advising the king to restrain passions and try cases or administer ***Vyavahâras*** according to ***Dharma***, the author mentions that the subjects follow the king who does this, "as the rivers the ocean."[7] The fact that Sukrâchâryya has to lay down the humane rule that if a "bound-down" or ***âsiddha*** person[8] violates the limitations imposed upon him when swimming a river, &c., he is not guilty (and should not be punished) is also an evidence in point." The rule that "anybody who can save somebody's wealth from absolute destruction owing to the ravages of water or deluge[9] (from rivers, &c.) has right to one-tenth" points to the same adaptation of juristic ideas to the physical features of the country.

Rivers are no negligible features in the topography of the country for which Sukrâchâryya's code has been designed. The fact that rivers[10] are very changeful and constantly shift their beds was well-known. And the advice[1] that one should not cross the rivers by arms or get into a boat that is likely to give way, indicates the familiarity of the authors with rivers. These are to be wisely used in the interests of the state's commerce. Means must be adopted to make them highways of water-traffic, as also the impediments presented by them to land-communication must be removed. That rivers should not be allowed to remain barriers to intercourse, as naturally they are, is sufficiently suggested in the following advice: "Bridges should be constructed over rivers.[2] There should also be boats and water-conveyances for crossing the rivers." "Roads are to be povided with bridges."[3]

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[1] Sukra I, 478-9.

[2] Sukra IV, vi, 8-9.

[3] Sukra IV, vi, 11-12.

[4] Sukra III, 262-63.

[5] Sukra I, 425-28.

[6] Sukra IV, vii, 492.

[7] Sukra IV, v, 210-211.

[8] Sukra IV, v, 564-64.

[9] Sukra IV, v, 601-2.

[10] Sukra III, 283-284, "one should not trust the abodes (beds or channels) of rivers."

But rivers have been mentioned in *Sukranîti* specially in connexion with agriculture and land-revenue, and the inferences that can be made from accounts of the natural resources of the state do also point to the importance of rivers as sources of the country's national wealth. The observation of Herodotus that 'Egypt is the gift of the Nile' is in the Hindu sage's language expressed by saying that the lands are the 'daughters' of rivers, or rivers are the 'mothers' of soils. But rivers are not the sole irrigators of lands, there are other mothers of lands also *e.g.*, rains, tanks, wells, &c. In the assessment of lands the ruler is advised to make a distinction between land and land on the basis of the nature of the source of water-supply. Thus "the king should realise one-third, one-fourth, or one-half from places which are irrigated by tanks, canals and wells, by rains and by rivers respectively." The equity of this diversity of assessment lies in the fact that where rivers are irrigators the cultivation is certain, and hence the Government demand is heaviest. But Sukrâchâryya is also aware of the fact that, though rivers are superior to all other sources of irrigation in point of certainty, the moisture yielded by them, however, is not copious,—and do in fact yield the palm to clouds which, though precarious and uncertain, give abundant water when they do pour down their contents. The difference between rivers and clouds is like that between ordinary well-to-do men and sovereigns in the matter of riches. And the analogy that naturally suggests itself is expressed in the following lines: "Can the nourishment that is due to the rain-water from clouds be derived from the water of rivers[4] &c.? So also the promotion of the people's weal depends on the property of the king. Can this accrue from the wealth of the rich folk ?"

From the above account of rivers[5] it would have been sufficiently clear that the authors of the Sukra cycle were well-acquainted with the importance of rivers in Politics, Commerce, Agriculture and Public Finance, and that the general aspect of the country is that of a plain intersected by rivers rather than that of rugged mountainous defiles and precipices.

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[1] Sukra III, 52-53.

[2] Sukra IV, iv, 125 129.

[3] Sukra I, 35.

[4] Sukra IV, ii, 227-229, cf. also Chaptor III, 552-554. "Agriculture which is said to have rivers for mothers is a good occupation."

[5] Sukra V, 14-16.

(c) *Seas.*

Coming now to the hydrosphere of Sukrâchâryya's country we find that the sea is a familiar sight with the poets of the Sukra cycle. The connexion between the moon and the sea is too well-known to all Hindu poets. In describing or defining the seven constituent elements of a state Sukrâchâryya characterises the first element, the sovereign, as by nature or by connotation of the term the person who is the cause of the prosperity of this world, is respected by the experienced and old people and gives pleasure to the eyes (of the people) as the moon to the sea."[1]

A phenomenon connected with the sea which appears to have been very familiar with the poets or at least known to them by hearsay, *viz.*, the maritime navigation by boats, is very naturally pressed into service by the poet in describing the evils resulting from the imperfections of the ruler. Thus we read that " if the king is not a perfect guide his subjects will get into trouble as a boat without the helmsman sinks in a sea."[2] The comparison of the king with a *karṇadhâra*[3] or helmsman piloting the 'ship of the state' is very suggestive. Nor is this all. The importance of sea and maritime commerce is adequately recognised by the statesmen of the Sukra cycle in the plan they have framed for the site and structure of the Capital city. It is to be situated at a place which, like the ' city of the seven hills' in ancient Italy, is to be near, but yet distant from, the sea.

Pliny ascribed much of the importance of Rome to this condition. We find Sukrâchâryya also suggesting that the spot is to be " bestirred by the movements of boats up to the seas." The capital is to enjoy the advantages of both rivers and seas. Communication with the sea has thus been recognised as an integral factor of the state's commercial wealth. It is also an element of the sovereign's political importance and dignity. The ambition of swaying the destiny of an empire from sea to sea or ruling the world encircled by the ocean has always fired the enthusiasm of Hindu kings and statesmen as would be evident from even a superficial study of Sanskrit literature as well as the inscriptions[4] on copper-plates and other materials describing gifts of lands, &c., to worthy persons or to the gods by sovereigns and ministers.[5]

Flatterers and sycophants as well as court-poets when applauding the merits of their protectors never stop short of the reference to the seas as the natural boundaries of their conquered territories. This ideal of having an empire bounded only by the sea is also present in the imagination of Sukrâchâryya, who, in urging the necessity of moral education of princes, sets before them this laudable mission of their lives as a sufficient spur to their self-culture. Thus, "how can the man who is unable to subdue one's mind master the world extending to the sea?"[1] Verily, the sea is the natural limit of one's ambition—the "scientific frontier" of Indian Napoleons.

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[1] Sukra I, 127-28.

[2] Sukra I, 129-30.

[3] The mention of *nâvikas*, boatmen or sailors, in connexion with the various crafts or industries to be maintained by the King (II, 404-5) also points to the importance of rivers and seas in the topography of *Sukranîti.*

[4] Sukra I, 425-28.

[5] Mr. Aiyangar's *Ancient India* contains various accounts of the maritime importance of the Chola Empire and Kingdoms in South India; and Mr. Akshay Kumar Maitra's *Gaudalekhamâlâ* or the Manual of the Inscriptions of the Pâlas and Sens of Bengal gives numerous evidences of the natural ambition of rulers to be master of the seas.

An indirect knowledge of the sea and its inmates is suggested in the lines which advise people always to be humble and modest. Thus "the wise man should never consider 'I am superior to all, I am more learned than others,' for one should remember that there is the animal which devours the devourer of whales,[2] *Râghava* is the devourer of that even, and there is the destroyer of *Râghava*." The whale is certainly a sea-animal, and the mammoth fish *Râghava* is a monstrous marine creature celebrated in Hindu folk-lore.

Among the islands of the sea we have found that *Sinhala* or Ceylon has been mentioned definitely by name as the place where people can make artificial pearls. References to islands are to be met with only in two other places in this treatise. Thus in describing the grades of rulers in the order of their revenue Sukrâchâryya mentions the highest as the *Sârvabhauma*[3] or the paramount sovereign to be the ruler whose income, calculated according to modern Indian monetary standards, would exceed Rs. 416,666,666, and "to whom the earth with its *seven islands* is ever bound." The second mention of islands is in connexion with the punishment of offenders. "Persons who are wicked by nature should be expelled from the commonwealth and bound and transported to islands."[4] The use of islands as convict settlements is unmistakably suggested here.

From the foregoing description of general physical features of the country as are suggested by casual references or "internal evidences," it is not at all possible to make any definite inference as to the exact *locale* or surroundings in the midst of which *Sukranîti* might have been composed. The accounts are all of a very general character and cannot be traced to any special sets of geographical influences. It is, however, certain that the country does not present a dull monotony or uniformity of physical aspects, both in lithosphere and hydrosphere.

SECTION 4.

Climate and Soils.

The same diversity and variety of natural facts and phenomena of the land of Sukrâchâryya would also be clear from an analysis of the other aspects of its physiography, *e.g.*, its meteorology, geology and vegetation.

I. Meteorology.

Though *Sukranîti* is not a text-book of physical geography, the varied atmospherical and climatological conditions of the country familiar to the authors can be gathered from various duties prescribed to kings and people as well as from the description of customs and rites during the several periods of the year and from the metaphors or similes occasionally used in elucidating or illustrating the ideas.

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[1] Sukra I, 197-198.

[2] Sukra I, 368-74.

[3] Sukra III, 446-447.

[4] Sukra IV, 215-216.

Heavenly Bodies

The sovereign is the lord of both "movable and immovable worlds;"[1] and among the thirty-two *vidyâs* or sciences there is the mention of *Jyotiṣa* as one of the six *Vedângas* or branches of learning auxiliary to the study of the Vedas. It is the science which "measures time by studying the movements of *nakṣatras* (stars) and *grahas*[2] (planets)" and the aid of other sciences. Besides, it is said that the movements, shape and nature of the *nakṣatras*[3] (stars) are one of the factors in the division of time into epochs or periods. In all these instances it is evident that Sukrâchâryya displays a knowledge of the heavenly bodies, both planetary and fixed, and is acquainted with the facts of their movements and their effects on time.

Some of these heavenly bodies have a double character—first, as members of the Solar System governing the conditions of time, season, &c., as noticed above, and, secondly, as apotheosised into divine beings and made rulers of certain directions of the Universe. The sun and the moon are two such gods in Hindu mythology, and Sukrâchâryya mentions that the sovereign, besides being made out of the permanent elements of other gods,[4] *e.g.*, Indra, Vâyu, Yama, Fire, Varuṇa and Kuvera (who are the lords of six specified regions marked out by six points of the compass), has in him the attributes of the sun and the moon also. Thus "just as the moon pleases human beings by its rays, so also the king satisfies everybody by his virtues and activities." Also, "as the sun is the dispeller of darkness (and the creator of light), so the king is the founder of religion and destroyer of irreligion."

Besides the above comparison of the king with the heavenly bodies which is a common device in all *Nitisâstras*, the poets of the Sukra cycle have displayed another popular fancy about the orbs of the celestial world. The nine *Mahâratnas* or great gems mentioned in *Sukranîti* have each a deity presiding over it. These deities have to be satisfied by people by putting on the gem that is favourite to each. These deities are the *navagraha*[5] or nine planets of the heavenly firmament, *viz.*, the Sun, the Moon, the Mars, the Mercury, the Jupiter, the Venus, the Saturn, the Râhu and the Ketu. The subject will be treated at length in the chapter on precious stones and metals. It may be mentioned here, in passing, that the colour attributed to these deities apotheosised out of the heavenly bodies, the *navagraha*, in the propitiatory hymns addressed to them exactly corresponds with the colour and lustre of the *Mahâratnas*,—*vajra*, *muktâ*, *pravâla*, *gomeda*, *indranila*, *vaiduryya*, *pusyarâga*, *pâchi* and *mâṇikya* which are supposed to be the favourites of those beings respectively.

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[1] Sukra I, 141-143.

[2] Sukra I, 41-42.

[3] Sukra IV, iii. 88-89.

[4] Sukra I, 14-1151.

[5] Sukra IV, ii, 84.

The Sun.

The Sun has been already referred to as having something to do with Time in its capacity as a member of the Solar System. Its second character is that of a deity who gives light, whose attributes the king possesses. Its third character is that of one of the *navagrahas*, in which capacity it is to be propitiated by people by the use of the *mâṇikya*[1] or ruby, " which has red colour and the bright lustre of the Indragopa insect."

Besides these super-terrestrial references, the mundane phenomena of the Sun as the "dispeller of darkness"[2] and the source of heat have also been mentioned in *Sukranîti*. Among the general rules of life it is stated that one should not always look to the Sun (III, 61). Sukrâchâryya compares the companionship of wicked characters to the rays of the burning Sun : "One should abandon the company of bad men which is terrible like the desert scorched by the summer Sun,[3] frightening and inhospitable." The Sun's rays, however, are not all terrible, they are of varying degrees. So it is only towards enemies that the king should display his character of the "summer Sun."[4] But towards his own people he should present the milder front of the " Spring Sun.''[5]

As to the division of time noted above it is mentioned that there are three systems of temporal measurements. " Time is divided according to three systems—solar movement,[6] lunar movement (period from full moon to full moon, *i.e.*, two fortnights) and according to Savana (period from morning to morning, *i.e.*, 24 hours)." These three[7] systems do not yield equal results, the solar day being longer than the lunar; and so it is suggested that " in making payments of wages one should always take the solar[8] time, in augmenting interest, the lunar time."

The Moon.

The Moon, also, like the sun, has three-fold characteristics : (1) those of a member of the solar system governing time, seasons, &c., (2) those of a deity who gives pleasure, whose attributes the king possesses, and (3) those of the apotheosised celestial being who has to be propitiated by people by the use of its favourite gem, *viz.*, *muktâ*[9] "which is of red, yellow, white and *śyâma* (greenish blue) colour."

In *Sukranîti*, the sun and the moon have been mentioned very often together :[10] and this not only with reference to the super-mundane affairs as noticed above, but also in the matter of secular references. Thus, if the influence of bad men is like that of the burning sun, that of good people is like that of the moon. "The man who is attended by good men gratifies the heart in the same way as the moon[1] with its cool rays pleases the tank with its newly blossomed lotuses." This parallelism is carried forward to the elucidation of the various attitudes the king should have. Thus, if he should be the summer Sun to enemies, and the spring Sun to his own people, he should bear the attitude of the autumn Moon to the learned people. The autumn is the season after the rains, hence very clear and generally cloudless; and the moon would then shine in all its glory. The king who has this attitude must have the most pleasant bent of mind; and this is what should be his mood towards the learned people. But the sun in spring season is hot enough, though milder than the summer sun; and this blending of mildness with severity should characterise his relations with the subjects, whereas he is to be solely severe and terrible towards the enemies. Again, as mentioned above, not only the sun, but also the moon governs the time. Among the three systems of temporal measurements[2] one is that of the division of time according to lunar movement, and this is to be adopted when the object is to augment the interest.

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[1] Sukra IV, ii, 84-92.

[2] Sukra I, 140.

[3] Sura I, 325-26.

[4] Sukra II, 566-67

[5] Sukra II, 566-67.

[6] Sukra II, 788-789.

[7] Sukra II, 789-790.

[8] Sukra IV, ii 85.

[9] Prof. Yogeśa Chandra Ray has treated the subject very elaborately in his scholarly work in Bengali on The *Astronomy and Astronomers of the Hindus.*

[10] In describing feathers and hairy rings called *bhramas* on the horse's body Sukra says that two such marks on the forehead with space between indicate good and are like the Sun and the Moon. (IV, vii, 206-207).

In Indian literature, generally, the moon plays an exceptionally conspicuous part The poets of the Sukra cycle also have given indications of this partiality in their composition. We meet with references to the moon alone over and above the parallelism or antithesis between itself and the sun, as detailed above. Thus, it was mentioned in connexion with the sea that "the king is the cause of prosperity of this world, &c., and gives pleasure to the eyes of the people as the moon to the sea." Then again, in enumerating the divine parts or attributes of the sovereign, Sukra asserts that he should possess all the qualities of the eight gods. Otherwise, he is a mediocre. "As the moon[5] does not shine well if deprived of one of its parts, so the king does not flourish unless he has all the parts described above." The moon is thus beautiful and splendid only when it is full. But there are beauties and beauties; so the beauty of the moon, when deprived of some of its parts, say a quarter or a half or even seven-eighths,[6] is not insignificant. The shape of the half moon is a beautiful sight to the poets of the Sukra cycle, who have suggested that "the capital should have the beautiful shape of the half moon[7] or circle or square." The moon in Indian literature is not only a standard of beauty, but is also a common object-lesson of gradual growth. Thus the crown-prince is "to grow slowly like the portion of the moon[8] in the bright fortnight." There is another convention with Hindu poets regarding the parts of the moon. If the waxing of the moon in parts through a whole fortnight supplies the analogy for the development of adolescence in infants, especially princes and princesses, the waning or the gradual reduction of its parts throughout the dark fortnight supplies the stock-in-trade for comparison with the giving away of wealth and property in charity. In the chapter on general rules of morality for the people, Sukrâchâryya thus describes the effects of gifts: "In this world there is nothing more capable of subduing others than charity and simplicity. The moon[1] that has waned through gifts, when waxing, is beautiful, though in the form of a curve." Here we have both the beauty of the curve and the comparison of giving away with waning in the same line. It has to be noted, moreover, that shape is only one of the elements in the beauty of the moon. The other element is lustre. Sukrâchâryya mentions it when describing a weapon of war, *e.g.*, the "*Kṣuraprânta* which is high to the navel, has a strong fist and the lustre[2] of the moon."

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[1] Sukra I, 323-324.

[2] Sukra II, 566-567.

[3] The Astronomical knowledge of the poets of the Sukra cycle will be dealt with in a subsequent chapter.

[4] Sukra I, 127-128.

[5] Sukra I, 152.

[6] Sukra I, 429-430.

[7] Sukra II, 101.

[8] Sukra III, 432-433.

The Atmosphere.

We have seen above that the ambition of paramount sovereigns in India was never restricted to the lithosphere and that in quest of victory they must reach and govern the hydrosphere also. The glory of swaying even the atmosphere is, likewise, another touchstone of monarchical sovereignty. With Hindu poets it is a common device in extolling their heroes to cry them up to the skies, both literally and figuratively. The man or sovereign whose fame does not reach the skies is not a famous person indeed. Kâlidâsa in introducing the rulers of the solar dynasty to the readers of his celebrated *Raghuvamsam* mentions their mastery of the three worlds, the land, the water and the aerial regions in one short line, *âsamudra-kṣitiśânâm ânâkarathavartmanâm* (*i.e.*, his heroes were rulers whose sway included the earth and the sea and whose chariots used to traverse the highways of the sky).

Sukrâchâryya, therefore, in order to make his precepts of discipline and self-control palatable to the princes, does not forget to give them a sugar-coating by mentioning the glorious and enviable results of practising them in life. Thus, "of the monarch who has conquered his senses, and who follows the Nîtisâstra, prosperity is in the ascendant and fame reaches the skies."[3]

There is another reference to the sky in *Sukranîti*. This is in connexion with the adoption of proper policies and methods of work with regard to friends and foes. "By appropriate means the terrestrial beings can soar into the sky[4] and even the thunder can be pierced." The efficacy of human intelligence is here illustrated by allusion probably to the air-chariots of ancient times, called *Vimânas* or *Puṣpakarathas* which have had a strong hold on Hindu popular tradition. Such an air-chariot piercing the thunder, *i.e.*, going beyond the region of clouds, &c., and traversing the whole distance of India from Ceylon in the South to Ayodhyâ in Upper India has been immortalised by Kâlidâsa in the 13th canto of *Raghuvamsam.*

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[1] Sukra III, 432-433.

[2] Sukra IV, vii, 427.

[3] Sukra I, 301-302.

[4] Sukra IV, 50.

The Air or Vâyu has been mentioned as one of the eight gods whose attributes the king possesses. Its function is propagation or diffusion. Thus "as Vâyu[1] is the spreader (and diffuser) of scents, so is the king the generator (and cause) of good and evil actions." The current of the air has been suggested in the line which advises the king to move along the line of least resistance, just as "clouds do not move against the wind." The poets of the Sukra cycle have also mentioned the air as the friend of fire in order to draw the moral that Right always should follow Might and that morality does not flourish where there is no strength. The precept is given in the following lines : "One should follow *niti* or the moral rules so long as one is powerful. People remain friends till then ; just as the wind[2] is the friend of the burning fire." A common phenomenon regarding the air has also been recorded : "It is possible to protect the lamp with its wick and oil from the wind[3] with great care."

The Clouds.

Clouds and rains have been often referred to in *Sukranîti*, as we have seen above in connexion with rivers. Rains[4] are some of the physical factors in the division of time into periods or epochs. The analogy by which the poets of the Sukra cycle illustrate the advantages of punctuality, regularity and keeping to time generally, indicates the very important place rains occupy in the physical and economic conditions of the people among whom they lived. The work done at the time appointed for it is certain to produce good results. Thus rains[5] in time give rise to plenty, but otherwise are highly injurious. In India, the land of monsoons, where people depend on the rains for cultivation, uncertainty and precariousness of the rainy season mean famine and ruin. This observation of the author, therefore, is certainly to be attributed to one of the predominant features of the physical environment. The same idea has been repeated in section 1 of Chapter IV : "Where the clouds do not pour rain[6] in season, there the lands are not productive and the commonwealth deteriorates, &c."

The lands that are irrigated by clouds pouring their contents upon them are said to be *devamâtrika*, *i.e.*, to have the gods or natural agencies, *e.g.*, Indra the cloud-god, for their parent ; just as lands watered by rivers are known to be *nadimâtrika*, *i.e.*, to have them as their mothers.

We have noticed previously that Sukrâchâryya's Land-Revenue-Policy is equitable and elastic. Thus, where rain is the source of moisture, agriculture is precarious and uncertain, since the monsoons do often fail. Hence, the demand of the Government is to be very small compared with that from lands irrigated otherwise. "The king should realise one-third, one-fourth or one-half from places which are irrigated by tanks, canals and wells, by rains[7] and by rivers respectively." It has also been noticed above in connexion with rivers that, though rivers are certain when compared with rains, they cannot however yield the plenty that nature does. Thus "can the nourishment that is due to rain-water from clouds[1] be derived from the water of rivers?"

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[1] Sukra I, 145.

[2] Sukra IV, vii, 376-377.

[3] Sukra I, 41-42.

[4] Sukra I, 573-574.

[5] Sukra I, 106.

[6] Sukra IV, i, 122-123.

[7] Sukra IV, ii, 227-229.

There are two other references to clouds in *Sukranîti*, one is about their colour. The *Mahâratna Indranila* which is Saturn's favourite, has the "colour of black clouds."[2] The other reference mentions them as the source or mother of pearls.[3] This will be discussed in a subsequent chapter.

The Seasons.[4]

The foregoing accounts of the country of the poets of the Sukra cycle leave no doubt that, generally speaking, it is (1) a land of the powerful sun and (2) a land of rains. It is thus both hot and moist.

It is a noteworthy fact that there is no reference to extreme cold throughout the whole treatise, though there often occurs the idea of extreme heat. All the six Indian seasons of two months each have been mentioned in the treatise; and their explanation has been given to be the influence of temperature (*i.e.*, hot and cold) and moisture (*i.e.*, dry and wet). Sukrâchâryya divides Time in two ways: (1) Social or human, *i.e.*, historical, according to the events and movements in man's social life, *e.g.*, the age of Asoka, the epoch of the Reformation, &c., and (2) Physical, according to (*a*) the seasons and (*b*) the rotations and revolutions in the solar system which bring in days, nights, months, years. We have already alluded to the influence of the "movements, shape and nature of the planets" in connexion with the heavenly bodies. Here we shall point out the references in *Sukranîti* to the weather and seasons affecting the country's climate as determined by heat[5] and cold as well as drought and moisture.

The summer[6] which presents the sun scorching the desert has been already noticed; and we have also found that the king should present the front of the summer sun[7] towards the enemies. The summer being a terribly hot season, Sukra's advice to horsemen and jockeys of the Cavalry Department is that they should ride the horse[8] in the evening during that period, and to gardeners[9] that they should water the plants twice a day in the morning and evening. Again, as for the seasons of warfare, the "summer[10] is the worst." In India the summer is technically known to be the period of two months from the middle of April to the middle of June.

The rainy season extends from the middle of June, when the monsoon generally sets in to the middle of August. We have already noticed the importance given by the poets of the Sukra cycle to the regularity or punctuality of the rains, also the place they occupy in the economy of nature from a calculation of which equitable assessments of Land Revenue are to be made. In the rainy season horses require to be carefully treated, and Sukra's positive advice to horsemen[1] is not to use them during that period. It is not a good season for the use of carriages,[2] cars or chariots. Nor is it a convenient time for warfare. "In the rainy season[3] war is not at all appreciated, peace is desirable then." But it is very convenient for gardeners and agriculturists who are advised never to water the plants[4] during this period.

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[1] Sukra V, 14-15.
[2] Sukra IV, ii, 90.
[3] Sukra IV, ii, 117-118.
[4] See the summary of Kâlidâsa's *Ritusamhâra* or 'Cycle of Seasons' in Macdonell's *History of Sans. Literature*, p. 337.
[5] Sukra I, 41-42.
[6] Surka I, 325-326.
[7] Sukra II, 566-567.
[8] Sukra IV, vii, 266-267.
[9] Sukra IV, iv, 105-106.
[10] Sukra IV, vii, 446-448.

The Indian Seasons have played a great part in the history of Indian warfares. The monsoons which give rise to tempests and heavy downpours, swollen rivers, and malarial swamps have decided the issue of many battles and sieges in Eastern India. Relativity of politics to geographical environment is nowhere better illustrated than in the influence of the rains and rivers in Bengal and Assam. Can this, however, point indirectly to the locale or surroundings of the poets of the Sukra cycle ?

The autumn is a delightful season in India, generally cloudless, or rather with deceptive invisible clouds, extending from the middle of August to the middle of October. The autumn moon is celebrated in Indian poetry, because its lustre is then gloriously set off against the background of a pure blue sky. We have seen that Sukrâchâryya, in advising the sovereign to put on his most agreeable attitude when he has to receive learned men, asks him to be like the autumn moon. As for riders, they are enjoined to use the horse[5] in the morning in this season. The autumn is also one of the best seasons[6] for warfare.

hTe *Hemanta* is the season which forebodes the advent of winter. It extends from the middle of October to the middle of December. There are only two references to *Hemanta* in *Sukranîti*, both in connexion with military affairs. The *Hemanta*,[7] being a mild season, of decaying heat and increasing cold, horses may be used both in the morning and evening. It is also, like autumn, one of the best seasons for warfare.[8]

The winter is the next two months and has been mentioned in connexion with the riding of horses and also as a season for warfare. As in the preceding season, horses may be used both in the morning and evening in winter. It is likewise the most convenient period of the year for military operations. It is also enjoined that gardeners need not water the plants every day in winter;[9] they should do this every alternate day. As we have said above, the Sukra poets have dilated on the summer and its effects, but about the cold and the effects of winter generally they are very reticent. There is a mention of *hima* as one of the agencies that may injuriously attack the grains of the fields. But it is not clear what the purport seems to be. It may mean both dews and snows. The king has been advised to preserve in a store-house against future calamities such "grains as have not been attacked by poisons, fire or snows[1] (dews ?) or eaten by worms and insects, &c."

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[1] Sukra IV, vii, 268.

[2] Sukra IV, vii, 352-353.

[3] Sukra IV, vii, 446-448.

[4] Sukra IV, iv, 105-106.

[5] Sukra IV, vii, 266-267.

[6] Sukra IV, vii, 446-448.

[7] Sukra IV, vii, 266-267.

[8] Sukra IV, vii, 446-448.

[9] Sukra IV, iii, 56-57.

There may be a presumption that the summer being the principal season of the area within which the poets lived has left its influence upon their work; while the winter there being only one of the six seasons, and of no considerable inclemency, has been but scantily noticed and has had a very subsidiary effect on the poets' thought and life. If anything can be argued from the negative, it may be mentioned, as we have had reasons to state above, that the country of the poets of the Sukra cycle is a land pre-eminently of the summer and the rainy seasons.

The last Indian season is the Spring extending from the middle of February to the middle of April. It is the season *par excellence* of Hindu poets, the period of the hegemony of Madana, the Cupid of Hindu mythology. But the poets of the Sukra cycle are too prosaic statesmen and diplomats to be swayed by the conventions of orthodox poetical style. In fact, the whole work of Sukrâchâryya bears throughout the character of a serious matter-of-fact treatise on the most momentous problems of human life; and the authors have systematically and consistently maintained their dignity by not indulging in a single superfluous epithet or unnecessary descriptions and digressions in the interest of rhetoric, word-painting or the like; though no doubt the arrangement is occasionally diffuse and inconsequential, as in the works of Adam Smith and Montesquieu. *Sukraniti* is the last work to be handled for specimens of literary grace or embellishments. This is unfortunately one of the many reasons which prevent it from being characterised as the work of a certain epoch of literary history. Its style is that of solid scientific Sanskrit and cannot be easily put into one of the classes of ordinary poetry in Sanskrit literature. This will be elaborately discussed in a subsequent chapter.

There are four references to the spring in *Sukranîti.* The first is that in which the king is advised to be like the spring-sun, *i.e.*, neither too mild nor too severe, in the treatment of his own people. The second is in connexion with the use of horses. As in the Hemanta and winter, one should ride the horse both in the morning and evening in the spring season.[1] The third reference describes it as a good season[2] for warfare, better than the rains and the summer, but worse than the autumn, Hemanta and winter. The fourth mention of the spring is in connexion with the watering of plants during this period. This is advised to be done in the fifth part of the day, *i.e.*, in the afternoon.

II. GEOLOGY.

As could be inferred from the accounts given above, the country of Sukrâchâryya is mainly agricultural. From the diverse references to the occupations of the people it would be apparent that the soil is one which is fit for pasture and agriculture. And from the frequent mention of grasses, woods, forests

Sukra IV, iii, 56-57.

[2] Sukra IV, iv, 105-106.

and other signs of rank luxuriant vegetable growth, also, one could easily infer that the crust of the earth is made up of damp alluvial soil. But the poets of the Sukra Cycle know of other regions besides these fertile plains. They mention deserts scorched by the summer sun, as we have noticed above. Among fortresses[1] there are those in deserts also, and these are superior to the forts which are surrounded on all sides by ditches only. Then there are the "barren and rocky soils"[2] from which, according to the humane legislation of Sukrâchâryya, the king should realise only one-sixth as Government Revenue, as opposed to one-half from lands irrigated by rivers. Sukra mentions "uneven"[3] grounds also, and advises the horsemen to take special care in, or rather refrain from, using those regions. It is not clear, however, what is meant by 'uneven' lands. There may be a reference to ordinary undulations as are to be met with often in plains, or even to hilly tracts which are uneven wholesale.

The treatise of Sukrâchâryya contains several references to the earth underground. That the earth carries in its womb precious metals is a commonplace idea in Hindu literature. Possession of wealth is, in fact, an attribute of the earth. Sukrâchâryya also says: "The man who is powerful, intelligent and valorous enjoys the earth[4] full of its wealth." This is Sukra's version of the idea contained in the adage *Virabhogyâ Vasundharâ* (the *Vasundharâ*, the earth, which bears wealth can be enjoyed by the heroes alone). 'Mines'[5] have been often mentioned as one of the sources of Government Revenue. The section on Treasure gives details about precious stones, metals and other mineral products.[6] This will be treated fully in the next chapter—*The Data of Ancient Indian Mineralogy.*

The mention of sulphur[7] and *Suvarchi* salt (Saltpetre) in connection with the preparation of gunpowder may, however, be noted here.

SECTION 5.

Flora and Fauna.

We have found the country described in *Sukranîti* to be a land of diverse natural and physical features. Its wealth of mineral resources has also been hinted at in the last section. Nor is the land poor in its vegetable and animal denizens. The poets of the Sukra Cycle have nothing to do directly with plants, trees and shrubs or with birds, fishes and mammals. It is only in a subsidiary or auxiliary capacity, *e.g.*, as bearing on the social, economic and political life of man, that these creatures of the lower living world have any place in the treatise of Sukrâchâryya. But even then the authors have displayed a good deal of knowledge about the habits, habitats, food, diseases and structure or external characteristics of the plants and animals, as well as the uses to which they are put by man for the furtherance of his ends of life. We shall form an estimate of the Botanical and Zoological knowledge of these authors of the Sukra Cycle in subsequent chapters. This, together with an account of the mineral products of the country, would give an Economic Geography (as well as History) of India in ancient and mediæval times. In this section we propose to give only the names of the plants and animals occurring in *Sukranîti.*

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[1] Sukra IV, vi, 2, 11-12.

[2] Sukra IV, ii, 230.

[3] Sukra IV, vii, 268.

[4] Sukra I, 349-50.

[5] Sukra II, 211-212, 671-672; IV, ii, 213.

[6] These and allied subjects have been dealt with in the Bengali works on Gems by Prof. Yoges Chandra Ray and Dr. Ramdas Sen as well as in that valuable exposition of Hindu Culture in some of its secular aspects, *The History of Hindu Chemistry*, by Dr. P. C. Ray.

[7] Sukra IV, vii, 400-404.

I. PLANTS.

Grasses and woods have been mentioned several times. Among the functions of the Sudras one is that of carrying wood and grass.[1] The Capital should be situated at a place that abounds in trees and shrubs and plants, is endowed with good supplies of grain and is happily provided with resources in grasses and woods. There is an injunction that the wall of the capital city should have many strong shrubs.[3] Among the persons to be expelled from the commonwealth like "sturdy vagabonds" are people "who live on alms even though they are capable of collecting wood and grasses."[4] Men who collect grasses and woods[5] have to pay revenue to the state to the extent of one-third, one-fifth, one-seventh, one-tenth, or one-twentieth.

Vast forests[6] where elephants run to and fro have been mentioned figuratively in connexion with the moral training of the sovereign. "In a forest[7] of six *yojanas* (*i.e.*, forty-eight miles) the best *Râjamârga* is to be constructed; in the middle, the average, and between the two the worst." So the Forest-Administration of the State has provision for roads in extensive woody lands. Forests[8] are rich in wild games which are to be killed by kings in their hunting excursions that should be regular features of their lives. The forests are administered by a special officer[9] well up in agri-flori-horti-arbori-culture, as we should say in modern times. Solitary forests should not be frequented or even visited by people. This is one of the general rules of morality. The man who has a bad wife or who has to live on alms has been advised to "prefer life in a forest."[10] Forests are the places where wild trees should be planted. Among forest-produce there is the mention of honey.

Creepers have been mentioned only once. "Pandits, females and creepers[11]. do not flourish without resting grounds." The causes of the development of flowers[12] and fruits are known to the superintendent of parks and forests. Three of the sixty-four *kalâs* or arts are the planting, grafting and preservation

[1] Sukra I, 85-86.

[2] Sukra I, 425-428.

[3] Sukra I, 478-479.

[4] Sukra IV, i, 209-210.

[5] Sukra IV, ii, 237-238.

[6] Sukra I, 193-194.

[7] Sukra I, 528-529.

[8] Sukra I, 665-666.

[9] Sukra, II, 317-319.

[10] Sukra III, 576-577.

[11] Sukra I, 767.

[12] Sukra II, 317-319.

of plants, the use of preparations from sugar-canes[1] and the knowledge of the mixtures of metals and medicinal plants. Every root is supposed to have medicinal properties (II, 254-255).

Sukrâchâryya has divided trees into two classes, domestic and wild, and enumerated them in Section iv of Chapter IV. Besides these trees, several plants have been mentioned in *Sukranîti*, by name, which are being enumerated below: bamboos (IV, ii, 117-118 ; IV, iii, 190), lotus (I, 211-212), mustard (III, 619-620), betels (IV, iii, 198), paddy, tila, mâsa, mudga, yava (IV, iv, 107-108), peas, IV, vii, 285-286), cotton (IV, vii, 356-357), arka, snuhi, wheat (IV, vii, 432-33) and garlic (IV, vii, 400-404).

A careful study of the "habitats" or "Distribution" of these trees, plants and shrubs is likely to be of considerable help in determining the geography of the locality which produced the *Sukranîti*. This will be done in a subsequent chapter. The study of Plant-Geography with this object is more important than that of the distribution of minerals. For minerals, as commercial merchandise, may be transported easily from the localities which produce them, whereas plants are more or less stationary commodities which tell their own tale as to the soils, surroundings, etc.

2. ANIMALS.

Facts of Zoo-Geography also, like those of Botanical Geography, can be gleaned from passages in *Sukranîti*. But the enumeration of the animals referred to in it, though no doubt it may point, to a certain extent, to the physical environment of the authors' lives, is less important in this respect than that of plants, since common domestic animals, *e.g.*, birds, etc., as well as those used in the Army may be brought from a distance as marketable commodities. This aspect of the question, together with the knowledge of Zoology displayed in the work, will be treated at some length in a forthcoming chapter. Here we shall simply enumerate the various animals mentioned in the work to give an idea of the diversity of the lower creatures that has left its impress on the work of the authors of the Sukra Cycle.

Snakes and tigers have been often mentioned, and in various connexions. Among the wild animals or "big games" of the forest we find lions[2] and bears.[3] The domestic animals are many, *e.g.*, cows, buffaloes, goats, cats, dogs, sheep, deer. The aquatic animals are the fishes, cowries (II, 712-713), conches (II, 402-403), whales,[4] Râghava,[4] crocodiles, tortoise (I, 531), oyster shells.[5] The Animal-corps consists of the horse, the elephant, bulls and camels. Among birds we have the cuckoo (I, 337-338), the peacock,[6] the drake (I. 337-338), the cock (I, 654-657), the parrot (II, 300-2), the crane (I, 654-657), the pigeon or dove, the partridge, the hawk (II, 300-21) and the *châsha* (IV, ii, 87). Besides these, there are monkeys (I, 654-657), boars,[7] ants (III, 20-22), worms (III, 20-22), flies (III, 33-34), bees (III, 33-34) and rats (I, 654-657).

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[1] **Sukra IV, vii, 144-147.**

[2] **Sukra IV, i, 48-49 ; IV, iv, 331-334 ; II, 35-37.**

[3] **Sukra IV, vii, 330.**

[4] **Sukra III, 446-447.**

[5] **Sukra IV, ii, 117-118.**

[6] **Sukra I, 385-88 ; I. 665-666.**

[7] **Sukra III, 262-263.**

CHAPTER III.

THE DATA OF ANCIENT INDIAN ETHNOLOGY.

SECTION 1.

Sukranîti as a source of Ethnological Information.

Having briefly surveyed the plants and lower animals in the preceding sections it now remains to point out the races or tribes of men mentioned in *Sukranîti* to complete the picture of Bio-geography that may be deduced from it. But the poets of the Sukra Cycle are very chary of any positive information regarding the various nationalities that lived in their time. *Sukranîti* is the last work in which one should search for ethnographical details about ancient India. We have seen also how poor the work is as a manual of ancient and mediæval Indian geographical names. This is all the more striking, since the work being purely socio-economic and socio-political is expected to be rich specially in the names of kingdoms, peoples, princes and cities. But as the matter stands, the authors fight shy of individual names and deal only with generalities. That the country was a land of diverse races, creeds and tongues as well as of diverse plants, animals, minerals and natural features is evident from the references to "other lands and peoples," "strange countries," "countries and languages," we have already discussed, as well as from the mention of the writing of the characters of the various languages as one of the sixty-four *kalâs* or arts. We have already noticed also that among the benefits of travel has been mentioned the pleasure of knowing the numerous religious customs, materials, *races of men,*[1] hills, etc. The caste divisions with their intermixtures and customs (both domestic and social) which the Sukra authors have described in detail will form the subject of a separate chapter. The intermixtures,[2] and *antyajas* that have been mentioned in the section on the *arts and sciences* refer to the castes and will be treated along with them. Here we propose to survey the few details about the races of men mentioned in the treatise.

SECTION 2.

The Races.

The following are the tribes mentioned in *Sukranîti*: (1) Yavanas, (2) Khaśas, (3) Mlechchas, (4) Purvadevas or Asuras, (5) Râkṣasas, (6) Pisâchas, (7) Kirâtas, (8) Âryas.

Yavanas.

We have seen in a previous chapter that Yavanas, according to *Sukranîti*, "have all the four castes mixed[3] together. They recognise authority other than that of the Vedas and live in the north and west, their *sâstras* have been framed for their welfare by their own masters. But the rules that are followed for ordinary purposes are the same in the two cases." The purport is, that Yavanas differ from the children of the soil only in religion, but in matters of business, politics and the like there is no difference. The poets of the Sukra Cycle have mentioned *Yavanamata* or Yavanism as one of the thirty-two ***vidyâs*** or branches of learning. It is that philosophy which "recognises God as the invisible Creator of the Universe and recognises virtue and vice without reference to *Sruti* and *Smriti*, and which believes[1] that *Sruti* contains a separate religious system." It is thus the non-Vedic creed, or speaking generally, an alien or non-national faith.

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[1] **Sukra III, 262-263.** [2] **Sukra IV, iii, 22-23.** [3] **Sukra IV, iv, 74-77.**

Khaśas.

We have seen that the Khaśas have been mentioned only once. They are a people living in mountainous tracts to the south and west of the vale of Kâshmir. They are a people "who marry the widows of their brothers."[2]

Mlechchas.

Sukrâchâryya refers to Mlechchas five times. "Those who have deserted practising their own duties, who are unkind and troublesome to others, and who are very excitable, envious and foolish are Mlechchas."[3] The term has been used here metaphorically to connote certain undesirable, barbarous or alien characteristics rather than denote a race or tribe of men ethnologically or politically or even socially distinct from the ruling or predominant people. We find the term used in its literal sense as the name of a distinct race, caste or class of men in the following lines which describe the qualifications of persons from among whom recruits are to be drawn for the army as "officers" and "men." "Those who are well up in *Nîtisâstras*, the use of arms and ammunitions, manipulations of battle array and the art of management and discipline, who are not too young but of middle age, who are brave, self-controlled, able-bodied, always mindful of their own duties, devoted to their masters, and haters of enemies should be made commanders and soldiers whether they are Sudras, or Kṣatriyas, Vaisyas or descended from Mlechchas."[4] These lines exclude only the Brâhmaṇas of the predominant or the Aryan race recognising the system of castes and stages, and allow all the other three castes to be enlisted in the army. They, however, mention a fcurth class of men who may be likewise enrolled. They are evidently beyond the pale of Aryaism or Caste-and-stagism and certainly form a social polity by themselves.

This literal sense, however, is not observed, in the following lines. "The king who does not punish the false-speaking spy becomes the destroyer of the people's persons and properties and is called Mlechchha."[5] Here it is equivalent to an abuse or condemnation. The fourth reference in *Sukranîti* to the Mlechchas is in the literal sense of a race. This is in connexion with the Laws of Property.

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[1] **Sukra IV, iii, 124-126.**

[2] **Sukra IV, v, 98.**

[3] **Sukra I, 87-88.**

[4] **Sukra II, 276-280.**

[5] **Sukra I, 675-676.**

" In the Sâstras sources of income as well as the castes are known to be various, and that Dharma of the Sâstras always binds even the Mlechchas."[1] According to the injunctions of Sukrâchâryya the Mlechchas also must abide by the regulations regarding title to property which are obeyed by the Brahmaṇas, Kṣatriyas, Vaiśyas and Sudras, *i.e.*, the four castes of the Arya race. If the Mlechchas or whom the Greeks would have called "Barbarians," do not respect these laws, the community would be jeopardised, as is implied in the next line. " For the preservation of the community these have been fixed by previous sages." This is exactly what has been said about Yavanas[2] who, following their own apostles in matters of faith, must respect the civic laws of the state in which they live. The poets of the Sukra Cycle have displayed a pre-eminently modern conception by thus allowing freedom of religious convictions and practices but compelling obedience to one and the same system of non-religious laws throughout the realm. On the one hand, religious neutrality or toleration which implies a diversity of creeds, and on the other, uniformity or unity in economic, political and other secular interests,—these are the notions of the statesmen of the Sukra Cycle in the passages regarding the Yavanas as well as Mlechchas.

The literal sense of the term is to be noticed in the following lines where Mlechchas have been taken almost as a fifth caste or, at any rate, representing a class of men who do not fall within the fold of the four castes : " Not by birth are the Brâhmaṇa, Kṣatriya, Vaiśya, Sudra and Mlechcha[3] separated, but by virtues and works." Here, again, we have a very rationalistic interpretation of the Caste System, and this leads in the following lines to the use of the words, Brâhmaṇa, Kṣatriya, &c., almost in the metaphorical sense.

The Demi-gods.

Purvadevas[4] or Asuras are the disciples of the sage Sukrâchâryya. It is in the lectures of this Professor to his pupils that the present manual of socio-political science is said to have had its birth. The works of Plato and Aristotle in ancient Hellas had similar origins in the lectures to their pupils at the schools of the Academy and the Lyceum.

Vâtâpi is a king of the Asuras[5] mentioned by Sukrâchâryya to have been ruined through folly. Asuras have been mentioned as wicked beings or demons who attend the divine beings, the gods in the religious rites which are celebrated for them. They are in fact demigods, and their images have to be constructed along with those of the benign gods who destroy them. Sukra enjoins that "the images of Pisâchas and Asuras[6] are to be always sixteen *tâlas* (12 *angulas* make 1 *tâla*) Hiraṇyakasipu, Vritra, Hiraṇyâkṣa, Râvaṇa, Kumbhakarṇa, Namuchi, Nisumbha, Sumbha, Mahisâsura, Raktavija—these are to be sixteen *tâlas* in height." These are extraordinary dimensions, considering that the ordinary images of gods are to be not more than seven, eight, nine or ten *tâlas*

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[1] **Sukra IV, v, 585-587.**

[2] **Sukra IV, iv, 76-77.**

[3] **Sukra I, 75-76, 77-88.**

[4] **Sukra I, 1-3.**

[5] **Sukra I, 287-290.**

[6] **Sukra IV, iv, 179-182.**

(or feet), and the normal is always the seven-tâla type for *Kali Yuga*. It is clear that Asuras here do not denote a race of human beings, but a class of demi-gods or supernatural creatures—the Titans of Hindu Mythology.

Râkṣasas are likewise a race of Titans, the enemies or rather rivals of gods, and have been mentioned in *Sukranîti* not so much as human beings as mythical giants. But as in the case of Asuras one of their kings has been mentioned along with other Paurâṇika kings and Rishis as instances of failure through vices. We read that "Râkṣasa[1] Paulastya was ruined through vanity." About the images of these Râkṣasas we are told that "they are to be ten *tâlas*.[2] These images like those of the Asuras, Pisâchas and Râkṣasas, who may be figuratively regarded as their tribesmen, are to have "long thighs and legs, to be ferocious, cruel and vehement,[3] or sometimes very lean and thin."

Forest Tribes.

Kirâtas are a class of Âraṇyaka or forest-tribes. They have been mentioned only once in *Sukranîti*, and that in connexion with the division of the Army into two orders—that of the Standing Army and that of the Militia or National volunteers. To this latter class belong the "Kirâtas[4] and people living in the forests who have their own resources and depend on their own strength." These wild tribes are enlisted as soldiers, and they bring their own arms and accoutrements. These are probably independent races who do not ordinarily acknowledge suzerainty of the neighbouring chief.

Âryas.

The word 'Arya' has been mentioned only once. We are told that the "man who abuses the Âryas[5] and the gods" is one of those who are to be expelled by the King from the Commonwealth.

SECTION 3.

Identification.

We have now gone through the accounts of the Sukra poets about the various races mentioned by them in their work. It is doubtful if we should regard Purvadevas or Asuras, Râkṣasas, and Pisâchas referred to in the treatise as races of men, for they are really half-men, half-gods, belonging rather to the regions of demons, goblins and giants than to the mundane world of human beings. As for the others, the details are very few indeed. Except the Khaśas who can be identified, as they have been in Stein's *Raj Taranginî*, the Yavanas, Mlechchas and Kirâtas are more or less generic names of races very difficult to identify until the date of *Sukranîti* is fixed. This is, as I have suggested previously, *petitio principii* at the present stage of our knowledge regarding the branch of Hindu literature known by the name of *Arthasâstras* or *Nîtisâstras*.

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[1] Sukra I, 287-290.

[2] Sukra IV, iv, 171-172.

[3] Sukra IV, iv, 398-399.

[4] Sukra IV, vii, 28.

[5] Sukra IV, i, 105-106.

The terms *Mlechcha* and *Yavana* are very elastic, "chartered words" as they are called, and have been very loosely applied by Indian authors to anybody who is not of their race, religion or country. They correspond to "Barbarians" of the Hellenes, "Pagans" or "Heathens" of the Christians, "Kafirs" of the Musalmans, and "Welsh" of the English people. That these terms had definite 'connotation' as well as "denotation" in the initial stages of their history there is no doubt. But in the course of time, at any rate in *Sukranîti*, they have come to be almost identical or synonymous, and as we have seen, both of them metaphorically used to indicate anything that is ignominious, vile or despicable. What, however, we can definitely gather from the passages in the works of the Sukra Cycle leads us to the idea that perhaps the term *Mlechcha* is the genus and *Yavana* is one of its species. Thus Yavanas are a class of men who belong to the Mlechcha group of human races.

The term *Kirâta*, again, had a special significance when first used. But in *Sukranîti* it seems to be a generic name for all forest tribes without any special race-characteristics.

Though *Sukranîti* is silent about the homes, characteristics, etc., of the races incidentally mentioned in it, it would be interesting to know them from other sources. We, therefore, proceed to throw a sidelight on these races from accounts to be found in Sanskrit Literature.

Yavanas.

We have already discussed the locality and nationality of the Yavanas and quoted at length Dr. Mitra's conclusions. We may mention here that the word *Yavana* is not to be found in Vedic literature. The newly published "*Vedic Index of Names and Subjects*" (in two volumes) by Messrs. Macdonell and Keith does not notice either Yavanas or Mlechchas among the sixty-six tribes[1] or races enumerated in its index. The following observations of Principal P. T. Srinivas Iyengar,[2] however, are important not only as throwing some light on who may be regarded as the counterpart of the Yavanas and Mlechchas in the age of the *Mantras*, but also as contesting the orthodox theory of the Aryan invasion of India :

"The Vedic Mantras mention the names of about forty tribes who inhabited the regions known to their composers. * * * * Scholars have given the name 'Aryas' to those tribes among whom the Mantras were composed and applied the name to a supposed Aryan race which sent successive swarms of invaders to India, Persia, Greece, Italy, Germany, France, Britain, and civilised those lands in pre-historic times. But the progress of anthropology has proved the invasion and civilisation of Europe by the 'Aryans' to be a myth. Scholars yet cling to the theory of an 'Aryan' race so far as India is concerned. * * * The Aryas and Dasyus or Dâsas are referred to not as indicating different races, * * * The words refer not to race but to cult. * * * Ârya meant a worshipper of Indra (and Agni), and Dâsa or Dasyu meant either demons opposed to Indra or the people that worshipped these demons. * * * The Dasyus are without rites, of different rites, fireless, non-sacrificers, without prayers, without Riks, haters of prayer. * * * * Thus the difference between the Âryas and Dasyus was not one of race but of cult. Nor was there any difference of culture between the Ârya and Dasyu. The Dasyus lived in cities * * * possessed wealth, * * owned many castles. * * * Indeed Dasyu and Arya have been understood respectively as enemies and advocates of the fire-cult * * Sâyana defines Âryas to be those that sing hymns, practising fire-rites, and Dasyus to be enemies who destroy the observers of fire-rites, riteless."

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[1] See pp. 590-1.

[2] *Life in Ancient India*, pp. 8-15.

Leaving aside the controversy as to whether the distinction was one of cult and faith only or of culture and race also, we need not hesitate to look upon the Dasyus or Dâsas, the enemies of the Âryas, as the "Yavanas" of Vedic India according to the definition of Sukrâchâryya.

The following extract from Mr. C. V. Vaidya's *Epic India*[2] would throw a fresh light on the topic.

"In the Vedas the Aryans speak of themselves as distinguished from the Dâsas or aborigines and the Asuras or Iranians. Gradually through the epic period they lost sight both of the Iranians by distance and of the Dâsas or aborigines by extinction or assimilation. They now spoke of the Aryans as distinguished from the Mlechchas who surrounded their country. Let us examine who were included in that word. When the cow of Vasistha created the Mlechchas to destroy the army of Viswâmitra who was trying to take her away by force it is stated that the cow created from the serveral parts of her body the Pallavas, the Drâvidas, the Shakas, the Yavanas, the Shabaras, the Paundras, the Kirâtas, the Sinhalas, the Barbaras, the Khasas, the Chibukas, the Pulindas, the Chînas, the Hunas, the Keralas, and many other Mlechchas.[3] * * * It appears plain that the Dravidian peoples of the south were looked upon as Mlechchas equally with the Yavanas and Shakas. It seems also probable that the Aryans of India knew these Yavanas and Shakas and Hunas and Chinas long before they actually invaded India."

In *A Peep into the Early History of India*[4] Dr. Bhandarkar identifies the Yavanas with the Bactrian Greeks on the strength of a passage from Patanjali and the tradition alluded to by Kâlidâsa in the *Mâlavikâgnimitra* that Pushyamitra's sacrificial horse was captured on the banks of the Sindhu or Indus by Yavana cavalry. "The instances given by Patanjali * * * are *Arunad Yavanâh Sâketam* : *Arunad Yavano Madhyamikam*. This shows that a certain Yavana

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[1] Sukrâchâryya's account of Yavanas, who respect authority other than that of the Vedas and who have their own spiritual masters, exactly corresponds to this description of the enemies of the Vedic Aryas.

[2] Pp. 25-26 (Edition of 1907).

[3] It would thus appear that Yavanas are a species of Mlechchas, as has been suggested above; not Yavanas only, but also the Khasas and the Kirâtas mentioned in *Sukranîti* are thus two branches of the Mlechchas.

[4] Journal of the Bombay Branch of the Royal Asiatic Society (1900), pp. 370-72.

or Greek prince had besieged Saketa or Ayodhya and another place called Madhyamika when Patanjali wrote this. The late Dr. Goldstücker identified this Yavana prince with Menander. * * * In another place Patanjali gives *Saka-Yavanam*, as an instance of an aggregate *Dwandwa* which signifies that they were Sudras and lived beyond the confines of Âryâvarta." In an analysis of the historical inscriptions in the Cave-Temples of Western India[1] Dr. Bhandarkar says: "Gotamiputra Satakarṇi quelled the boast and pride of Kṣatriyas and destroyed the Sakas, Yavanas and Pallavas." On the evidence of inscriptions and coins his conclusion is that the Graeko-Indian or Yavana kings[2] were in possession of parts of India from about the beginning of the second century before Christ to the arrival of Sakas.

Dr. Bhandarkar's testimony refers to the Yavanas as rulers or warriors, and as such we find them in Ayodhyâ in Upper India, and also in the Deccan, the land of the Satavâhanas or Andhrabhrityas. But as a people with a certain culture, language and faith the Yavanas have been known to the Indians since at least the sixth century B. C. when Paṇini the great grammarian[3] flourished.

Mlechchas.

About the more generic word Mlechchas we qoute the following from Mr. Vaidya's *Epic India*:[4]

"At the end of the Epic Period the word Ârya comprises not only the three castes, but also the Sudra within it and is opposed to Mlechchas." Thus "all peoples who are outside the castes born of the head, the arm, the thigh, and the foot of Brahmâ, whether they speak the Aryan or the Mlechcha languages are Dasyus." (Manu X, 46.)

The following is also taken from the same work:

"The Mahâbhârata, Bhîsma Parva, Chapter IX, mentions 157 peoples in Hindustan properly so called, 50 peoples in the south, *i.e.*, to the south of the Nerbudda, and about 14 Mlechcha peoples beyond India in which term we include Afghanistan as well as Kashmir. * * * The countries and peoples to the east[5] were originally looked upon as Mlechchas.[6] They were the Angas, Vangas and the Kalingas. * * The Northern[7] Mlechchas comprise almost all those people who were undoubtedly known at the end of the epic period after the conquests of Alexander. But we cannot but believe that many of these peoples must have been known to the Aryans several centuries before."

"The Mlechchas[8] who attempted to speak the Sanskrit language committed mistakes," as would be evident from the following verse in the *Âdi*

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[1] Early History of the Dekkan, Section IV.

[2] A Peep into the Early History of India.

[3] Dr. Rajendralala Mitra's *Indo-Aryans*, Vol. II, (Edition of 1881), pp. 177-178

[4] P. 27.

[5] East of the Gandaki, the river mentioned in *Sukraniti* also.

[6] Vaidya's *Epic India*, pp. 280-288.

[7] *Ibid*, p. 271.

[8] *Ibid*, p. 331.

Parva of Mahâbhârata: " *nâryâ mlechchhantibhâshâbhih* " or the Aryas do not 'mlechchhise' in speech, *i.e.*, as the commentator explains it, do not commit mistakes in speaking, as has been already alluded to in connexion with Yavanas. The Mahâbhârata constantly speaks of the Aryas, *i.e*, the orthodox population of the country between the Himalayas and the Vindhya range as distinguished from the Mlechchas who inhabited countries beyond these whether to the East, South or the West. In the *Bhiṣma Parva* it is expressly stated in the beginning that the peoples were Aryâs, Mlechchas and mixed races."[1]

The metaphorical or non-literal use of the words, Ârya, Yavana and Mlechcha in certain passages of *Sukraniti* has already been hinted at. There are instances of this use in the Mahâbhârata also. Mr. Vaidya says: "The Aryans had not only not forgotten their race, but had also not forgotten the superiority of their race in morality, and we find the epics constantly using the word *Arya* to signify what is good and high, conscious of the facts that the word meant originally a race and that high morals were characteristic of that race only. *Anâryajushta*[2] is an expression of frequent occurrence in the epics showing that " not practised by the Aryans " was synonymous with "not good " or " not moral."

For the earliest use of the word Mlechcha we have to refer to a passage in the Satapatha Brâhmaṇa, "where it occurs in the sense of a barbarian[3] in speech. The Brahmana is there forbidden to use barbarian speech."

The long extracts from the works of Mr. Iyengar, Dr. Bhandarkar and Mr Vaidya must have made it clear that the Yavanas and Mlechchas have been names of different peoples in different periods scattered over various parts of India; and until and unless the date of *Sukranîti* is fixed it is impossible to identify the tribes who are meant by the poets of the Sukra Cycle in the passages which describe them as living in the North and West, professing non-Vedic faith and obeying their own spiritual guides. Or perhaps in these lines we have a clue to the date of the work, or at any rate, of certain portions of it. For whatever be the age of other parts of *Sukranîti*, it may be presumed that these lines were the composition of men at the time when Yavanas were definitely known to live in a specified quarter of India, namely *pratyaguttara, i.e.*, 'North-Western' or 'Northern *and* Western.'

Âryas.

We have incidentally noticed above that the word ***Ârya*** was often used not for a race but for the qualities of good breeding, etc., that the civilised people or orthodox Indian nations represented. In the passage quoted above from *Sukranîti* regarding the persons who abuse the Aryas as well as gods, it is doubtful if the word has been taken literally or metaphorically. But from the general trend of the whole treatise we may gather that a people "consisting of all the four castes is here meant as distinguished from the Mlechchhas." Messrs. Macdonell and Keith[1] give the following history of the word in Vedic literature: "Arya is the normal designation in the Vedic literature from the Rig-Veda onwards of an Aryan, a member of the three upper classes, Brahmana, Kshatriya, or Vaisya. * * * The Arya stands in opposition to Dâsa, but also the Sudra. Sometimes the expression is restricted to the Vaisya caste. * * * The word Arya also occurs frequently as an adjective to describe the Aryan classes or names. * * * Aryan foes are referred to beside Dâsa foes, and there are many references to war of Aryan *versus* Aryan. * * * In the later Samhitâs and Brâhmanas the wars alluded to seem to be mainly Aryan wars." It is thus clear that the three upper castes were called Âryas and the lowest the Dâsas. In the course of time, *i.e*, during the post-Vedic ages, the lowest classes, the Dâsas or Sudras, constituted the fourth caste of the Aryas. And the name Arya became opposed to Mlechchha, as we have seen above in the extracts from Mr. Vaidya's *Epic India*.

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[1] Vaidya's *Epic India*, pp. 23-24.

[2] Vaidya's *Epic India*, p 24.

[3] Note on the word *Mlechcha* in the *Vedic Index* by Macdonell and Keith, Vol. II, p. 181.

Kirâtas.

The Kirâtas have been mentioned in the Mahâbhârata as a species of Mlechchhas born out of Vasistha's cow. Kalidasa's hero, Raghu, in his *digvijaya* or 'conquest of the quarters of the globe' overpowers the Kiratas and other hill-tribes, somewhere near the Kailâsa mountain in the Himalayan ranges. The word is found in Vedic literature also. The following is taken from the note on the word in the *Vedic Index of Names and Subjects*: [1] "Kirâta is a name applied to a people living in the caves of the mountains. * * Later, the people were located in Eastern Nepal, but the name seems to have been applied to any hill-folk, no doubt aborigines, though the *Mânava Dharma Sâstra* regards them as degraded Kṣatriyas.

Râkṣasas and Pisâchas.

It has already been remarked that Râkṣasas and Pisâchas, as used in *Sukranîti*, seem to be half-men, half-gods, and not full human beings. "In the early Vedic literature[2] Râkṣas refers to demons, and is only metaphorically applied to human foes. No definite tribe is meant." This is the verdict of Messrs. Macdonell and Keith, who also assert that "similarly Pisâchas are not a tribe in Vedic literature, whatever they may have been later." The following is their note to the word *Pisâcha*: "Pisâcha[3] is the name of a class of demons mentioned in Atharvaveda and later. In the *Taittiriya Samhitâ* they are associated with Râkṣasas and Asuras, while opposed to gods, men and fathers. In the Atharvaveda they are described as eaters of flesh. * * It is possible that the Pisâchas were, as suggested by Grierson, really human foes like the north-western tribes. * * This is, however, not at all likely."

The following extracts from Mr. Vaidya's *Epic India* give us some idea of the homes of the Râkṣasas, whether regarded merely as 'ghouls' or real human beings: "The Rakshas and Râkshasas were originally a people who lived on the sea-coast. * * * Even in their conquest of the Punjab and the Upper Gangetic valley the Aryans must have sometimes come in contact with fierce cannibalic Dravidian races. * * * Aryan adventurers * * plant colonies in the Central Provinces only at suitable places, though they were frequently infested by Râkshasas. * * * In the Râkshas form of marriage the bridegroom was allowed to abduct by force the daughter of a Kshatriya whether she was a willing party or not. * * * The modern Deccan was pre-eminently the country of the Râkshasas."

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[1] *Vedic Index of Names and Subjects*, Vol. I, pp. 64-5, in the "Indian Text" series.

[2] Vol. I, pp. 157-158.

[3] *Ibid*, Vol. II, 516.

Asuras.

Asura is a very important word in Sanskrit literature, both Vedic and post-Vedic. We are especially interested in it, as our author Sukra is the *guru* or preceptor of the Asuras.

Rev. K. M. Banerjea is one of the first scholars to have studied the etymology of the word 'Asura' and the nationality of the race denoted by it. The following is taken from the Preface to his *Arian Witness*:[3] "No term in the Rig-Veda seems to have puzzled students, translators and commentators more than the word Asura. The modern idea denoted by the term is that of an ogre and a demon. The idea is annually embodied in the person of the Mahisâsura among the figures worshipped at the Durga Puja. He appears there as the fiercest of the goddess's enemies receiving his death wounds at her hands. In the Rig-Veda, however, the gods themselves are, all of them termed and accosted as Asuras, and one of them, introduced at the moment as the Creator of the Universe, is called the *all-knowing and wise Asura.* And yet the same Veda elsewhere gives an opposite picture of the character indicated by the term, corresponding to the modern ideal of a demon and an ogre, and the very same individuals are sometimes represented as Asuras, and again lauded as destroyers of Asuras. * * The Rig-Veda continues a witness of both senses, but the later Vedas and all subsequent *Sástras* give exclusively the odious sense of evil spirits, hostile to gods and Brahmanas and inimical to their long-cherished institution of sacrificial ceremonies."

This double character of the Asuras as (1) gods as well as the people who worship the gods, and (2) devils as well as the people who worship the devils has been explained by the evidences of Comparative Philology. The two branches of the Primitive Aryans, *viz.*, the Iranians (Persians) who have developed the *Zend Avesta* with the theogony of the Asuras, and the Indo-Aryans (Hindus) who have developed the Rig-Veda with the theogony of the Devas were once living on the same soil in a common home. Various causes of differentiation led at last to their separation as enemies and vilification of each other. The two stages of their relations, *viz.*, friendly as well as inimical, have been portrayed in the sacred literature of both the peoples. It is in the second stage

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[1] Vedic Index by Macdonell and Keith, Vol. I, p. 533.

[2] Vaidya's *Epic India*, pp. 6, 7, 8, 306.

[3] *Published by Thacker, Spink & Co. (1875).*

of their relations that the Iranian devils are the Indo-Aryan gods, and the Indo-Aryan devils are the Iranian gods. Thus the *Asuras*,[1] who are the beneficent gods of the western branch of the Aryans, have become the worst enemies of the *devas*, the gods of the eastern branch; while the *devas* of the eastern are the devils of the western.

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[1] This interesting topic has been dealt with by Dr. Râjendralala Mitra in his paper on *Primitive Aryans* in *Indo-Aryans*, Vol. II, and also in a short article by Mr. Maheshchandra Ghosh in the Bengali Monthly, the *Pravâsi*, Vol. VI, No. 11, pp. 587-593. For some of the characteristics of these eternal enemies of the Indian gods and peoples, see also Mr. Vaidya's *Epic India*, pp. 23, 25, 27, 93, 131, 294, 293, 353, 464, 504., and Fausboll's *Indian Mythology* (Luzac & Co.)

CHAPTER IV.

THE DATA OF ANCIENT INDIAN MINERALOGY.

SECTION 1.

Sukranîti as the 'Architectonic' Science.

Writing about Montesquieu, the French Philosophical historian of the eighteenth century, in his *History of French Literature*, Dr. Edward Dowden says: "The scientific researches of his day attracted him; investigating anatomy, botany, natural philosophy, the history of the earth, he came to see man as a portion of nature, or at least as a creature whose life is largely determined by natural laws. With a temper of happy serenity and an admirable balance of faculties he was possessed by an eager intellectual curiosity. 'I spend my life,' he said, 'in examining; everything interests, everything surprises me.' Nothing, however, interested him so much as the phenomena of human society. He had no aptitude for metaphysical speculations; his feeling for literature and art was defective."

Exactly the same character-sketch would apply to the Hindu sociologist, Sukrâcharyya, if we were to construct his biography out of the internal evidences culled from the literary production that is connected with his name The same non-metaphysical and pre-eminently human outlook, the same positive and scientific standpoint, the same comprehensive and encyclopœdic conception, the same aversion to literary and artistic flourish mark the intellectual framework of the authors of the Sukra cycle.

The merits and shortcomings of *Sukranîti* are identical with the merits and defects of the *Esprit des Lois*[1] which has been characterised by Janet in his *Historie de la Politique* as "undoubtedly the greatest work of the eighteenth century" and classed with Rousseau's *Contrat Social* as forming together the literary source[2] and spring of the revolutionary movement. The following are the words of Dowden about *The Spirit of Laws*: "The whole of his mind, almost the whole of his existence—is embodied in the *Esprit des Lois*. It lacks the unity of a ruling idea; it is deficient in construction, in continuity and cohesion. * * * It lacks unity because its author's mind was many-sided. * * * He would warn and he would exhort; he would help, if possible, to create intelligent and patriotic citizens. * * * Its ideas often succeed each other without logical sequence. * * * But he brought the study of jurisprudence and politics, in the widest sense, into literature, laicizing and popularising the whole subject; he led men to feel the greatness of the social institution."

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[1] Published in 1748.

[2] Sidgwick's *Development of European Polity* (1903) Lect. XXV.

The same may be said of *Sukraniti*, also, which has proposed for itself the function of prescribing rules for the promotion of human[1] welfare, and the furtherance of the interests of both peoples and kings. One finds in it the same copiousness of illustrations and multiplicity of details, the same occasional defects in arrangement and incoherency of treatment.

The explanation of this strength as well as weakness of the work is to be sought in its very scope and province, which are those of the 'science of all sciences,' the "architectonic" or the dominant science, as Aristotle would call it. Sukraniti, as such a master-science, in order to fulfil its mission as a guide-philosopher-friend to every class of human beings, must survey the whole universe from the planet to the sea-gull, and the daffodil to the star.

SECTION 2.

The Synthetic Philosophy of Sukrâchâryya.

All the facts and phenomena of the mineral, vegetable and animal worlds have bearings on human life and social progress. Professors of the "architectonic" science, therefore, have need of them. According to Comte,[2] social science is subordinate to Biology and is "related to the whole system of Inorganic Philosophy, because Biology is so." "The whole social evolution of the race must proceed in entire accordance with biological laws. * * * It is only by the inorganic philosophy that we can duly analyse the entire system of exterior conditions—chemical, physical, and astronomical—amidst which the social evolution proceeds, and by which its rate of progress is determined."

John Stuart Mill also believes that the scope of any profitable study of man's action in society must be co-extensive with the whole of social science. According to him, "a person is not likely to be a good economist who is nothing else. Social phenomena,[3] acting and re-acting on one another, cannot rightly be understood apart." Dr. Ingram[4] gives prominence to this encyclopædic character of Social Studies in his article on Political Economy in the *Encyclopædia Britannica* (ninth edition). His conclusion is that Political Economy cannot any longer command attention as a fruitful branch of speculation unless it is subsumed under and absorbed into general sociology." Not only economics, but politics also, "can only be scientifically studied as one part or application of the Philosophy of History." Says Professor Sidgwick: "I agree with Mill in holding that the scientific study of the different kinds of governments that have actually existed in human society ought to be pursued in close connexion with the scientific study of other important elements of the societies in question. * * * The division of intellectual labour ought not to be carried so far as to make us forget the influence exercised on government by other social changes,[1] for instance, by the development of thought, of knowledge, of morals, of industry." The science of Public Finance, also, which is closely related to Economics, Politics and History, is, as such, a study of man's social activities, and hence only one of the branches of the Architectonic science—Sociology.

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[1] Sukra I, 4—24.

[2] Carver's *Sociology and Social Progress* (1906), pp. 65—87.

[3] Marshall's *Principles of Economics.*

[4] Keyne's *Scope and Method of Political Economy*, Third Edition (1904), pp. 112—141.

The differentiation and specialisation of the sciences according to the principles of the division of labour have undoubtedly rendered immense service to the world of speculation. The physical sciences have been rendered more and more precise, mathematical and exact. The human sciences also have tended in the same direction. But this 'progress' of the sciences in the acquisition of mathematical accuracy has necessarily deprived them of their realistic and concrete character. The growth in 'exactness' and necessary abstraction has militated against the efficacy and utility of each alone as a manual of guidance to human beings. Modern philosophical thought is fully conscious of this 'other side' of specialisation, and recognises the limitations of the specialised sciences in the matter of framing practical rules or duties of life. Thus Dr. Keynes observes : "Few practical problems admit of complete solution on economic grounds alone. * * * More usually when we pass to problems of taxation, or to problems that concern the relations of the state with trade and industry, or to the general discussion of communistic and socialistic schemes—it is far from being the case that economic considerations hold the field exclusively. Account must also be taken of ethical, social, and political considerations that lie outside the sphere of Political Economy regarded as a science * * * If the art attempts a complete solution of practical problems, it must of necessity be to a large extent non-economic in character." This defect is inherent in all specialised sciences. The science, therefore, that would lay down absolute rules for the regulation of human conduct, cannot with advantage be separated from general political and social philosophy.[2]

Sukraniti is such a science or art of social philosophy and legislation. The authors of the Sukra cycle, without caring to expound their methods of investigation and explain the 'logic' of their science, have unconsciously followed the method of the most synthetic and comprehensive art that would turn to account all the physical and human sciences in order to prescribe the 'whole duty of man.' The countrymen of Sukrâchâryya were not, however, poor in methodology. The ancient scientific machinery of the Hindus has found an able exponent in Dr. Brajendranâth Seal,[3] whose short but erudite monographs have furnished the sound philosophic basis of the modern Indian school of historico-sociological research

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[1] Sidgwick's *Elements of Politics* (1891), pp. 5—6.

[2] Keyne's *Scope and Method of Political Economy*, Third Edition (1904), pp. 55—58.

[3] For Seal's Mechanical, Physical and Chemical Theories, as well as Scientific Method of the Ancient Hindus, see Dr. Ray's *Hindu, Chemistry*, Vol. II., pp. 59—290.

SECTION 3.

The Place of Mineralogy in Sukranîti.

It is this comprehensive view-point of the Sukra legislators that supplies the *rationale* of their discussion of purely physical and material phenomena in their treatise on morals. Investigations regarding stones, gems, metals, minerals, buildings, roads, gardening, images, forts, arms, weapons, plants and animals—all these are integral parts of the *Nitisâstra*, according to this conception, which otherwise would remain incomplete. Mineralogical, Architectural, Sculptural, Botanical, Zoological, Veterinary and Agricultural ideas have thus a natural and necessary place in the *Sukraniti*, and are not mere appendages calculated to swell its bulk.

Consistently with this, we might expect greater prominence given to climatological and general geographical facts in the work of the Sukra statesmen, as in the work of Montesquieu. But, as we have seen, *Sukraniti* is rather defective in this respect. It treats of the geographical and meteorological phenomena in a very subsidiary capacity. As auxiliary to the main study, Sukra authors might devote greater attention to the Earth which is the theatre of all human activities and one of the principal aspects of the positive background of a people's social life. The authors, however, refer to the hills and rivers, seas and seasons very casually and incidentally, as it were, to illustrate their points or explain their ideas. This is all the more strange, since the observation and tabulation of natural phenomena were regularly instituted in ancient India in order to determine the fortunes of men and princes. Thus the *Brihat Samhitâ*, an astronomical and astrological work of the 6th century A D., is a comprehensive study[1] of the physical features and aspects of the universe, *e.g.* clouds, rains, planets, winds, earthquakes, storms, plants, animals, jewels, &c., and of their influences on the course of human affairs—social, economic, and political. This treatise is the "*Physics and Politics*" of the Hindus written about 1500 years ago, and anticipates "*the Spirit of Laws*," the first important European work on the study of physical forces and energies, as affecting human history by, over eleven centuries.

The treatment of mineralogy in *Sukraniti* is threefold:

(1) As a feeder or contributor to the 'architectonic' science, Sociology, the position of Mineralogy is inevitable like that of the other physical sciences.

(2) As incidental or stray references which cannot be prevented in any work of considerable proportions, Mineralogical, like Botanical, Engineering,

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[1] The scope and province of this work have been described by the author himself in Chapter II. See Iyer's Translation (printed at the South Indian Press, Madura, 1884), pp. 3-12. See along with this Buckle's *History of Civilisation*, Vol. I, Montesquieu's *Spirit of Laws*, Book XIV (English Edition in the *World's Great Classics Series*), Bagehot's *Physics and Politics*, Dunning's *Political Theories*, Vol. II, pp. 418-428, 112-113 (Macmillan 1905), Bluntschli's *Theory of State* (Third Edition, 228-236). In 1880-1882, a trial was made in the Baroda State to ascertain whether the probable rainfall of the coming monsoon could be predicted from observations of clouds according to principles laid down in *Brihat Samhitâ*. The result was eminently successful.

Zoological, and other ideas of physical science, furnish valuable clues to the general culture of the epoch or epochs in which portions of *Sukranîti* might have been composed. Our treatment of Geographical Data in a preceding chapter has been mainly directed by this search for 'internal evidences,' as they are called.

(3) As directly bearing on the socio-economic and socio-political interests of man. The authors of the Sukra cycle have a judicious sense of proportion and scientific selection. They are not tempted to long-winded and labyrinthine inquiries involving prolix digressions within digressions that characterise the *Encyclopædia Indicas*, called the *Purâṇas*. Facts of physical science have been laid under contribution only according to their need. These writers have displayed the same rational discrimination that marks the literary activities of modern thinkers. Says Dr. Keynes:[1] "While Economics has to take account of the operation of physical laws, it is still concerned with them only indirectly. It does not seek to establish or explain the physical laws that are involved in agriculture or mining or manufacture. This is the function of such sciences as mechanics, chemistry, geology and the science of agriculture. * * * The relation of political economy to the physical sciences is then simply this, that it pre-supposes them; it is sometimes concerned with physical laws as premisses, but never as conclusions. * * * The science is not directly concerned with the technique of different trades and occupations."

In treating of the minerals, metals, stones, &c., (as the other facts of physical world), the philosophers of the Sukra cycle have closely followed the method of the moderners. Thus the chemical, crystallographical, medicinal, and metaphysical speculations over the gems and metals have been sedulously avoided by them. *Sukranîti* has referred to the metals and precious stones only as they affect the economic, financial and political life of the people. The Data of ancient Indian Mineralogy that this work on social and moral legislation yields would thus afford a valuable picture of the commercial geography and economic history of the country in by-gone days, as we have hinted at in a preceding chapter. For, though "the distribution of minerals over the surface of the earth is much less obvious phenomenon than that of plants and animals, it has always been of great importance[2] in determining the distribution of man and his settlements."

Like the geographical data, these would supply some of the evidences by which it may be possible to fix upon the *locale* of certain portions of the treatise as well as their date.

SECTION 4.

History of Hindu Mineralogy.

(*a*) *Literature on Metals.*

The philosophers of the Sukra cycle have drawn upon mineralogical literature very sparingly indeed. One cannot but admire the sobriety and restraint of these authors when one remembers how easily they might tend to indulge in the mythological, alchemical and metaphysical notions regarding the mineral world which held sway over both the East and the West[1] for centuries. The Sukra authors have very creditably displayed their ratiocinative intellect and scientific spirit by rejecting all other aspects of precious stones and metals known in their literary circles, and using only such facts and figures as are relevant to the socio-political scope of their work.

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[1] Keyne's *Scope and Method of Political Economy* (1904), pp. 84-86.

[2] Newbigin's *Modern Geography* in the Home University Library Series.

For the uses of minerals have been known to the Hindus from the earliest times. In 1877 the late Dr. Udoy Chand Dutt brought out his *Materia Medica of the Hindus*,[2] in the first part of which he gave an account of the mineral or inorganic medicines used in ancient times under five heads : (1) mercury, (2) metallic ores and earths, (3) metals, (4) salts, (5) precious stones ; of the mode of their preparation, their chemical composition, and the principal combinations in which they were employed in different diseases. About the same time Dr. Rajendralal Mitra's *Indo-Aryans* and *Antiquities of Orissa* revealed to a certain extent the knowledge of the ancient Hindus in the use of metals and gems in arts, industries and handicrafts.

In order to appreciate the value of Hindu mineralogical literature that is implied and indicated by the actual use of minerals for the diverse purposes of human life, it is necessary to estimate the present character and history of the science as it obtains in Europe.

"Mineralogy[3] is the science which describes and classifies the different kinds of mineral matter constituting the material of the earth's crust and of those extra-terrestrial bodies called meteorites. The study of minerals is thus a branch of natural history, but one in which certain of the exact sciences find an application. The determination of the composition and constitution of minerals is a chemical problem ; their optical and other physical properties are determined according to the principles of physics ; the study of the crystalline form and structure belongs to crystallography ; their modes of occurrence, origins, associations and changes come within the province of geology and petrology ; while a consideration of the localities at which they are found requires some acquaintance with geography. Finally, there is the economic side, dealing with the mining and application of useful minerals, the extraction of metals from their ores and the uses of minerals for building, decoration and jewelry."

The above description of the science can apply to Mineralogy in its last and very modern phase since about 1860. Says the Editor of the *Mineralogical Magazine* :[4] "It was not until the end of the 18th and beginning of the 19th century * * * that any advance was made in scientific mineralogy. It was then recognised that * * * * external characters were more or less accidental. * * * In 1809 exact measurements of crystalline forms of many minerals were made. * * * In 1819 and 1821 * * * impetus to optical examination. * * * Under the microscope * * exact determination (1867)."

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[1] For an account of the progress of Alchemy in Europe, see the *Story of Alchemy* by Muir in the *Library of Useful Stories* Series.

[2] The materials supplied by this work have been subsequently laid under contribution in the preparation of *Hindu Chemistry* by Dr. P. C. Ray and in the work of Gondal.

[3] *Encyclopædia Britannica*—11th Edition.

[4] *Encyclopædia Britannica*—11th Edition.

It would thus appear that in the west the scientific era is essentially modern, to be counted only by generations. All writers on minerals and allied subjects have up to the beginning and the first two decades of the 19th century been interested only in such aspects as would, in modern phraseology, be regarded as mainly 'unscientific.'

Such Hindu writers on minerals in ancient and mediæval mines are a legion. It has been a fashion for long to credit very little of original achievements in secular literature and civilisation to the people of Hindustan. But this notion is being falsified by the explorations and researches of Indologists. So far as minerals and jewels are concerned, Sanskrit literature[1] has been very prolific in producing treatises which have varied from epoch to epoch, according to the changes in the culture of the people. We have already referred to Dr. Dutt's survey of the chemico-medical uses of minerals by the ancient Hindus. This work is based on standard Sanskrit medical works and has copious references to the original literature on the subject. Dr. Prafulla Chandra Rây has discussed the historical, chemical, medicinal, metallurgical, and generally the scientific values of some of these treatises or sections of treatises in his celebrated *History of Hindu Chemistry*. The late Dr. Râmdâs Sen of Moorshidabad[2] contributed in Bengali a monograph on the gems from original Sanskrit sources and edited the *Agasti-matam*, *Ratna-Samgraha* and *Maṇi-parikṣâ*, three Hindu works on precious stones. The subject of precious stones and jewels has also received an elaborate and comprehensive treatment in Bengali, especially in their crystallographical, economic, and geological character, in the hands of Prof. Yogeś Chandra Roy of Cuttack, who has tried to interpret the knowledge of the ancient Hindus in the light of the modern sciences. The enlightened Doctor of Music, Râjâ Sir Saurindramohan Tagore's work on gems called *Maṇimâlâ*,[3] published in 1881, covers over one thousand pages. This encyclopœdic work compiled in Sanskrit, Hindi, English and Bengali languages has drawn illustrations from over one hundred Sanskrit, English and Persian works. Of these, the number of Sanskrit authorities consulted is sixty-four.

Among the modern exponents of Hindu culture in these branches, Dr. Tagore's monumental work was followed by Dr. Sen's. Neither of them, however, tried to combine the East with the West in their endeavours. That has been done by Dr. Dutt, Dr. Prâfulla Chandra and Prof. Yoges Chandra, who have succeeded them and brought their scientific scholarship to bear on the mineralogical literature of the ancient Hindus. It is from the learned works of these scholars that the following summary of treatises on metals and gems has been compiled.

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[1] The *Vastuvidyâs*, *Silpasâstras*, &c., and other branches of Hindu secular literature will be treated of in a subsequent chapter.

[2] With the help of Pandit Kâlivara Vedântavâgisa (1885).

[3] See *Ratna-parikṣâ* by Prof. Yogesh Chandra Roy, who has also noticed the work of Sir Râjâ Râdhâkânta Dev, the *Savda Kalpadruma*, a Sanskrit Encyclopædia (1822-1858).

Mineralogy is not the *forte* of the Sukra philosophers. They are not specialists in this branch of learning. At any rate, their scope does not allow them to display any special knowledge regarding the metals and gems. They have to deal with these things, because they are the 'sinews of war' and form the *koṣa* (or treasure) or one of the seven constituents of the *Râṣtra* or the state. Their knowledge of these valuables must, therefore, depend on the literature of the specialists who flourished along with them. But as the geography as well as chronology of the authors of the Sukra cycle are anything but certain, it is all the more necessary that we should have an idea of the progress of the Hindus in mineralogical knowledge. For it is then only that one can assign the historical and geographical value of the section on metals and gems in *Sukranîti*.

The knowledge of the Hindus on the subject of metals has been discovered in all branches of Sanskrit literature from the earliest times to the middle of the sixteenth century A. D. From Dr. P. C. Roy's Survey of Hindu Chemical[1] literature we get *pari passu* the following epochs of mineralogical culture in ancient and mediæval India :

I. VEDIC LITERATURE.[2]

The following is the list of metals compiled for the *Vedic Index*[3] by Macdonell and Keith : *Ayas* (bronze, iron), *Kârṣṇâyasa* (iron), *Candra* (gold), *Jâtarupa* (gold), *Trapu* (tin), *Rajata* (silver) *Loha* (copper), *Lohâyasa*, *Lohitâyasa*, *Syâma* (iron). *Syâmâyasa*, *Sisa* (lead), *Suvarṇa* (gold), *Harita* (gold), *Hiraṇya* (gold).

" Rudra[4] is described as shining with brilliant golden ornaments. * * * The Aswins are also adorned with golden ornaments. The Asuras had plenty of gold and jewels," " Blacksmiths[5] made spears, swords, hatchets, needles, awls, iron legs for those who had lost their natural ones, iron-forts * * * Goldsmiths melted gold and fashioned bright jewels."

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[1] This survey is necessarily connected with the history of medical knowledge of the Hindus, and is in fact another aspect of the same thing. Dr. Ray's work therefore closely follows, and is to a certain extent based upon, that of Dr. Dutt. See Dr. Sen's chapter on metals in *Ratnarahasya*, also Prof. Yogesh Chandra's Essay on metals in *Ratnaparikṣâ*. See the *History of Aryan Medical Science* by the Thakur Saheb of Gondal (1895), pp. 134-138, 145-147, and *Medicine of Ancient India*, Part I, Osteology (Oxford, 1907) by Dr. Hoornle, pp. 1-18.

[2] See *Atharava-Veda* in the *Harvard Oriental Series* pp. 17 (amulet of lead), 35 (gold amulet), 272 (amulet of three metals).

[3] See Vol. II, p. 584.

[4] Râjendrâlâl Mitra's *Indo-Aryans*, Vol. I, p. 227, which gives several evidences from the Vedas about the knowledge and use of metals.

[5] Srinivas Iyengar's *Life in Ancient India in the Age of Maṇtras*, pp. 28-29, p. 41.

Not only as the materials for arts, industries or as 'measures of value,' but also as having healing powers we find the minerals mentioned in the Vedas. "It is of interest to note the alchemical[1] notions which had gathered round gold and lead at the time of the Atharva Veda. * * While gold is regarded as the elixir of life, lead is looked upon as the dispeller of sorcery." "According to Roscoe and Schorlemner, the ancient Hindus were the first to discover gold. All the appellations that have been applied to gold by different peoples of the ancient world bear testimony to this statement. * * According to Roscoe and Schorlemner,[2] the different nations gained their knowledge of extracting iron from its ores from the Hindus."

II. AYURVEDIC LITERATURE[3] (from the Pre-Buddhistic era to 800 A.D.)

(1) The *Charaka Samhitâ*, based on the medical treatise of Agniveṣa, mentioned in pre-Buddhistic literature, indicates "the six metals[4] and their calces as drugs appertaining to the earth," discusses the nature of the alkali, treats of the five kinds of salts, mentions sulphates of copper and iron as minerals for external application, and describes iron, gold and silver tonics.

(2) *The Susruta Samhita*,[5] later than the *Charaka*, *par excellence* a treatise on surgery, treats of the preparation and use of alkalies and alkaline caustics, recommends the six metals and their calces as drugs in 'only one śloka,' has 'vague references' to mercury, and describes lead and tin as vermifuge.

(3) *The Bower MS.*,[6] a medical work attributed to one Susruta, copied within the period from 400 to 500 A.D., mentions sulphates of copper and iron as ingredients for hair-dye and considers Bitumen as a product from the following four metals : gold, copper, silver, iron.

(4) The *Aṣtânga hridaya* of Vâgbhata (probably a Buddhist of Sindh, 8th cent. A.D., but according to Dr. Kunte, of the 1st or 2nd cent. B.C.), 'the heart or kernel of the eight limbs or divisions of Ayurveda,' is mainly an epitome of the *Charaka* and the *Susruta*, mentions mercury only once and treats of the preparations of gold, silver, copper, iron and lead.

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[1] *History of Hindu Chemistry*, Vol. I, First Edition, pp. vi, vii.

[2] Quoted from Major B. D. Basu's Prize-Essay on the *Hindu System of Medicine* published in Guy's *Hospital Gazette* (1889).

[3] See the *Preface* to Dr. Dutt's *Materia Medica of the Hindus* for the medico-chemical (mineralogical) literature of this period, also references to original authorities in the body of the book.

[4] Quoted by Dr. Rây from A. C. Kaviratna's *Translation of Charaka Samhitâ*, pp. 6-7.

[5] See the Bengali translation by Kavirâj Devendranâth Sen (1900), p. 268, where *seven* metals have been mentioned, the additional one being bell-metal, and *ranga* is used for *vanga*, i.e., *trapu* (tin).

[6] Edited by Dr. Hoernle, published by the Superintendent of Government Printing, Calcutta (1893-1909). See Part II, Fasciculus II, pp. 162-164. The drugs recommended are mainly vegetable. For references to metals, gold, copper, &c., and gems, see General English Index.

(5) During this period also must be mentioned the vast mass of Hindu, Jaina and Buddhistic literature in Sanskrit and Prâkrit, which embodies the original and characteristic products of Indian intellect, and in which are mirrored the brightest epochs in the history of Indian culture. This is the period[1] of Indian history properly so called, as it covers roughly the interval between the age of precursors of Paṇini[2] and Buddha and the epoch of Harṣavardhana and Houen Tsang,—the last prominent landmark of Hindu civilisation,—or if we push this limit further down, the age of the Pâlas of Bengal and the Cholas of the South in the 8th and 9th centuries A.D.

Dr. Dutt's *Materia Medica* does not, from the nature of the subject, refer to any authorities other than medical. Dr. P. C. Rây's work also is silent about the non-Ayurvedic branches of Indian literature during this period of over 1,600 years regarding the light they throw on alchemy, medicinal preparations, metallurgical operations, technical arts, the use of coins, arms and implements, &c., and the theory and practice of the transmutation of metals.

It is impossible to collect all the information on the subject of metals that this non-medical literature in Sanskrit and Prakrit may yield. Dr. Gustav Oppert's Essay on the weapons and war implements of the Ancient Hindus, and Dr. Râjendralâl Mitra's essay on Architecture, Dress and Ornament in ancient India, Furniture, Domestic Utensils, Musical instruments, Arms, &c., in ancient India in the first volume of his *Indo-Aryans*, as well as the historical works on Indian Art (including Architecture, Sculpture and Painting) by Fergusson, Havell, Coomâraswamy, Vincent Smith, and Manomohan Ganguly casually bring before us stray evidences from the literature and secular achievements of this period. The following evidence of Mr. Schoff, in his edition of the *Periplus*, published with the object of throwing light on ancient Commercial Geography and History, tells its own tale: "Philostratus of Lemnos, about 230 A.D., mentions a shrine in Taxila in which were hung pictures on copper tablets representing the feats of Alexander and Porus. The various figures were portrayed in a mosaic of orichalcum, silver, gold, and oxidized copper, but the weapons in iron. The metals were so ingeniously worked into one another that the pictures which they formed were comparable to the productions of the most famous Greek artists."

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[1] This has been subsequently (p. 74) called the *Classical Period*—Pre-Buddhistic, Buddhistic as well as Post-Buddhistic—the age of Darsanas, Purâṇas, Kâvyas, &c. For a brief account of the literature of this period, see Sir Bhandarkar's paper in the *Journal* of the Bombay Branch of the Royal Asiatic Society, 1900, pp. 388-408.

[2] The date of Paṇini is still an open question. The nearest limit is that placed by Macdonell at about 350 B.C. Max Müller could not arrive at any decision. About a year before his death, this European savant wrote to Rai Bahadur Sris Chandra Basu, the learned translator of the *Aṣṭâdhyâyi of Paṇini*: "Even Panini's date is still a riddle to me, both as to his predecessors and his successors. The date now assigned to him in the 4th cent. B.C. is useful as a working hypothesis, but no more. Perhaps you may be able to throw more light on it."

III. TANTRIC LITERATURE (from 800-1200 A.D.)

This is the period of the Empire[1] of the Pâlas in East India and Cholas in South India. The characteristic features of this period, so far as Northern India is concerned, are :

(1) in socio-religious life, the further development of Mahâyânic Buddhism, the continuation of the processes of the merging of decadent Buddhism in revived Hinduism, and the completion of the amalgamation[2] of the mythology of Śaiva-cum-Śâktaism with the doctrinal, devotional, and ritualistic machinery of the neo-Buddhistic Theogony, Cosmogony, and Theology ;

and (2) in literature, the continuation of Purâṇas, and the ascendancy of *Tantras*, which, beginning in the early centuries of the Christian era (if not earlier) as hand-books of Hindu socio-religious life, gradually tinged, modified, and swallowed up the literature of the Hinduised Buddhists of the Mahâyânic school, and finally absorbed (during this period) the whole intellectual activity of the people in philosophy, religion, alchemy, and other departments of human thought. The *Tantras*[3] may in a sens be looked upon as the ***Purâṇas*** or *Encyclopaedia Indicas* of India on the eve of Islamisation.

The mineralogical literature of this period includes the following:—

(1) The works of Nâgârjuna (7th-8th cent. A.D ?), the founder and embodiment of Mahâyânism, and the author of alchemical Tantras.

(*a*) *Rasârṇava* gives the tests of a pure metal, treats of the extraction of Zinc from Calamine, mentions the six metals, treats of the colouring of metals, and describes an apparatus for killing metals.

(*b*) *Rasaratnâkara*[4] treats of the purification of minerals, the extraction of Zinc from Calamine, dissolution of gems, and mentions several apparatus.

(2) Vrinda's *Siddhayoga* (900 A.D.) mentions Nâgârjuna as an authority, and closely follows Charaka, Susruta, and Vâgbhata, describes preparations

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[1] See Mr. R. D. Banerji's *Memoir on the Pâlas of Bengal* (L. A. S. B.), and *Gauḍarâja-mâlâ*, a Bengali work, by Mr. Ramâprasâd Chanda ; and *Ancient India* by Mr. Krishnaswamy Aiyangar. Dr. Rây calls this the Transitional Period.

[2] A full survey of this aspect of East Indian civilisation has been given in *Adyer Gambhîrâ*, a learned Bengali work by Mr. Haridâsa Pâlit. Portions of Mr. Pâlit's work are being rendered into English as materials for my forthcoming *Studies in Hindu Literature*.

South Indian life of this period is characterised by the rise of two new cults, Śaivaism and Vaiṣṇavism militating against and assimilating decadent Buddhism.

[3] For this second feature of the period between 800 and 1200 A.D., see Dr. Rây's resumé of authoritative opinions in the first chapter of his Introduction to *Hindu Chemistry* Vol. II: "Alchemy was included in the curricula of studies" "at the colleges in connexion with the monasteries of Pâtaliputra, Nâlandâ, Vikramasilâ, Udandapura, &c.," in East India from 5th to 12th cent. A.D. Tamil literature has yet to be studied in the same light.

[4] The enumeration of these Tantras and other alchemical works has been made in this book in an order slightly different from that in the *History of Hindu Chemistry*, as suggested by the new light thrown in Dr. Rây's Introduction to the 2nd volume.

The division into periods of mineralogical literature has also been modified in this book to suit its requirements. Dr. Rây's division into Tantric and Iatro-chemical periods in the 1st Edition of the First Volume was certainly a tentative one.

in which Sulphide of Copper and Æthiops mineral figure and also a process of killing iron.

(3) Chakrapaṇi[1] Datta's medical treatise (1050 A.D.), written at Gauda during the period of the ascendancy of the Pâlas, liberally recommends compounds of metals as medicinal drugs, treats of the black sulphide of mercury, powder of copper compound and a process of killing iron.

(4) Govindabhâgavat's *Rasahridaya* (11th century), written at the request of the king of Kirâta land, *i.e.*, the region adjoining modern Bhutan, mentions the six salts, the noble metals, essential metals, &c., and treats of the properties of metals.

IV. Modern Literature (13th cent.—16th cent.)

This is the period :

(1) in politics, of (*a*) the gradual establishment of Islam as a power and the foundation of Moghul Imperialism, (*b*) small independent Hindu kingdoms, especially the kingdom of Vijayanagara, the "Forgotten Empire" of the South, which presented a formidable bulwark against the inroads of the new power, and (*c*) the advent of the Portuguese ;[2]

(2) in socio-religious life, of (*a*) aggressive Islam accelerating the further fusion of Hinduism and Buddhism, and calling forth the assimilative and adaptive capabilities of the people of India, and (*b*) the rise of new cults in all the four quarters of India ;

and (3) in literature, of (*a*) the continuation of Purâṇas, Tantras and other Sanskrit works, and of (*b*) the growth and development of new languages and literatures embodying the aspirations of Kavira, Nânaka, Tukârâma, and Chaitanya—the founders of the new age.

The following Sanskrit works mentioned by Dr. Rây may be placed during this period:[3]

(1) *Rasendra Chuḍâmaṇi* (12th—13th cent. A.D.) of Somadeva gives tests for killed iron, treats of the residues from lead and tin, and describes the apparatuses.

(2) *Rasaprakâsasudhâkara* of Yasodhara (13th cent.) describes the extraction of zinc from calamine and a process for the fabrication of gold.

(3) *Rasakalpa* (13th cent.) describes the six metals, minerals and the processes of killing them. The author says, "I have performed the experiments with my own hands, and have seen them with my own eyes. They are not recorded from mere hearsay or from the dictation of a teacher."

(4) *Rasa Sâra* (13th cent.) of Govinda acknowledges its indebtedness

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[1] Sanskrit Text edited by Kavirâjas Sen (Calcutta).

[2] "The political influence of the Portuguese as early as 1533 A.D. is evident from the fact that Sultan Bahadur, King of Gujrat, entered into a treaty with them."—*Memoirs of Hindusthan.*

[3] The sub-divisions of this epoch into Tantric and modern according to the *History of Hindu Chemistry* have not been adopted here. The treatises also have been slightly re-arranged. Vernacular Literature of these four centuries remains yet to be ransaked for a more complete picture of the secular life of the Hindus.

to the Buddhists of Tibet, is a comprehensive, but purely chemical work dealing with 18 operations on Mercury.

(5) *Rasaratna-Samuchchaya*[1] (13th—14th cent.) contains elaborate treatment of mercury, copper, pyrites, extraction of zinc and copper, sulphur, cowries, gems, processes of reducing gems to ashes, the pure metals, the metals which emit a fœtid odour, and alloys, the laboratory and the accessories.

(6) *Rasarâjalakṣmi* (14th cent.) of Viṣnudeva, court physician to King Bukka of Vijayanagara, mentions the common mineral salts.

(7) *Rasanakṣatramâlikâ* (14th cent.) of Mathana Simha, court physician to the king of Malwa, liberally recommends mineral preparations and mentions opium as a drug.

(8) *Rasaratnâkara* (14th cent.) of Nityanâtha quotes Nâgârjuna, Chakrapâṇi, and *Rasendrachuḍamaṇi.*

(9) *Sârṅgadhara-Samgraha* (1363 A.D.), written at Chitor under the Chauhans, treats of the purification and incineration of *seven*[2] metals, but does not mention zinc, has been quoted by Bhâva Misra.

(10) *Dhâturatnamâlâ* (14th cent.), by Devadatta of Gujrat, is "devoted exclusively to short processes of killing metals and minerals. Six metals are recognised at the outset, but later on *Kharpara*,[3] which is the mineral calamine, is taken as synonymous with jasada or zinc."

(11) *Nighantu*,[4] by king Madanapâla of Kanauj (1374), mentions the metals as drugs, among which there is zinc or jasada.

(12) *Rasapradipa* (16th cent.) describes a detailed process for the preparation of mineral acids and mentions the remedy for the Portuguese disease called Syphilis (Phiringiroga), is quoted by Bhâva Misra.

(13) *Dhâtukriyâ* (16th cent.) mentions the country of the Phiringis as well as Ruma (Constantinople), enumerates the metals, gives their synonyms and localities, mentions zinc, and speaks of 'imitation gold,' by which one can enrich oneself.

(14) *Bhâvaprakâśa*[5] (after 1535, about 1570 according to Dr. Wise) mentions new drugs, and the Phiringiroga, and recommends mineral preparations as drugs, greatly eclipsing the vegetable.

(15) *Râjanighantu*[6] (17th cent.) of Narahari Pandit, has a chapter called *Suvarṇâdivarga*, and mentions the minerals, treating of their medicinal effects.

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[1] See the Text published by the Anandâsrama Office, Poona (1901), pp. 22-34, or the Extracts in Dr. Rây's *Hindu Chemistry*, Vol. I.

[2] "From the time of the Susruta to that of the Rasaratna-Samuchchaya we find all along *six* metals. * * * In the medical lexicon ascribed to king Madanâpâla and written about 1374 A.D., Zinc is distinctly recognised as a metal under the designation of Jasada." *Hindu Chemistry*, Vol. I, First Edition, p. 86. Sukranîti mentions *seven* metals and two alloys.

[3] " Zinc is not mentioned by the older writers, such as Susruta"—Dr. Dutt. See the chapter on Zinc in his *Materia Medica*.

[4] See the Edition of Pandit Jivânanda Vidyâsâgara (1875), pp. 50-56, Chapter IV.

[5] See Dr. Dutt's Preface to his *Materia Medica* (1877).

[6] See the Hindi Edition (1883) published from Benares, pp. 129-142.

SECTION 5.

History of Hindu Mineralogy.

(*b*) *Literature on Gems.*

The preceding survey, though scrappy and inadequate, must have made it clear that the Hindu literature on metals has grown mainly round the practical arts connected with industry, medicine and alchemy. The literature on precious stones also has developed through the same circumstances, and has had a similar history.[1] It is to one or other of the several epochs in the growth of this metallurgical, medicinal, and alchemical literature on gems that the portions of *Sukraniti* dealing with these topics have to be referred. We, therefore, proceed to give a brief history of this literature.

The knowledge of the use of gems has, like that of the metals, been discovered in almost all the branches of Hindu literature, and, therefore, may be conveniently grouped for historical purposes under the same epochs as those for metals. Besides the treatises mentioned above which are common to both metals and gems, there are special treatises which have to be noticed here in connexion with gems. The chief difficulty in the classification into epochs lies, as always in Indian historical problems, in chronology. The dates have been in most cases conjectural.

We have noted above that Dr. Tagore's encyclopædic work on gems has drawn upon sixty-four Sanskrit treatises. Dr. Râmdâsa Sen's work in collaboration with Pandit Kâlivara Vedântavâgisa is based on *Brihat Samhitâ*, *Mâṇiparikṣa*, *Sukraniti*, *Mânasollâsa*, *Amaraviveka*, *Hemchandrakosa*, *Muktâvali*, *Râjanighantu*, *Agnipurâṇa*, *Garuḍapurâṇa*, *Agastyamatam*, and *Ratna-Samgraha*. Another important work on the subject is *Yukti Kalpataru*[2], which is in manuscript, but has been used by Prof. Yogesh Chandra Roy in his *Ratnaparikṣâ*.

Fully conscious of the chronological defects, we add here a short history of the literature on gems in the Indian world :

I. VEDIC PERIOD

Precious stones and jewels are mentioned in Vedic literature. " Maṇi is the name in the Rigveda[3] and later of a jewel used as an amulet against all kinds of evil. That either pearl or diamond is denoted is not clear. * * The Maṇi is certainly worn round the neck." " In the Brâhmaṇa of the old recension of the *Yajurveda* jewellery[1] is recommended to be strung on gold." The *Atharva-Veda* in Harvard Oriental Series bears the following testimony: "The bit of Hindu folk-lore about the origin of pearls by transformation of rain-drops falling into the sea * * * * is at least ten centuries old. Born in the sky, ocean-born, brought hither out of the river, this gold-born shell[2] is for us a life-prolonging amulet."

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[1] The meagreness of this summary would be evident from the facts that (i) it has not been possible to gather information from even the most important works of non-Ayurvedic Sanskrit literature ; (ii) ancient Tamil literature has been wholly excluded, and (iii) old Prâkrit and vernacular works also have not been touched.

[2] Like the *Brihat Samhitâ* of Varâhamihira (6th cent. A.D.), this work ascribed to Râjâ Bhoja (probably 11th cent.) is a valuable repository of information regarding things Indian. One manuscript of this work belonging to Mahâmahopâdhyâya Pandit Adityarâma Bhattâchâryya , M.A. of Allahabad is in the library of the *Panini Office* and is being edited with translation and notes for the *Sacred Books of the Hindus Series* by the present author.

[3] Macdonell and Keith's *Vedic Index*, vol. II. pp. 119-120. See also pp. 304, 350.

II. CLASSICAL PERIOD[3] (800 B.C.—800 A.D.)

1. *Charaka* mentions gems as drugs appertaining to the earth, and gives a formula of 'the powder of pearl' compound.

2. *Susruta*[4] mentions pearls, vidruma, diamond, vaiduryya, sphatika (quartz) and other gems as cool and being antidotes to poison and useful in ocular diseases.

3. The Epics and Purâṇas refer to precious stones as ornaments for buildings, palaces, and images. The court of Yudhisthira, the cities of Dwârakâ and Ayodhyâ, the chariots, umbrellas, temples, &c., all testify to the use of emeralds, beryls, rubies, &c. We also read of gifts made in diamonds, pearls, corals and rubies, and also of plants, cows and hills made of gems.[5] The Mahâbhârata has often referred to *vaiduryya*, *vidruma*, *sphatika*, *suryyakânta*, *chandrakânta*, *indranila*, *padmarâga*, *diamond* and *marakata*.

4. *Brihat Samhitâ*[6] of Varâhamihira (505-587 A.D.) has four chapters on the examination of gems, refers to many previous *Ratnasâstras*, describes the characteristics of 22 gems, considers five of them only to be principal, begins the section on diamonds thus: "A good gem brings prosperity to the king, and a bad one brings misery. It is, therefore, necessary to examine the properties of gems with the help of persons learned in the science."

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[1] Mitra's *Indo-Aryans*, Vol. I, p. 239.

[2] *Atharva-Veda* in Harvard Oriental Series, Vol. I, pp. 161-162.

[3] This would include some of the Upaniṣads, the systems of philosophy, the epics, the literature of the precursors of Charaka and Pânini as medical men and grammarians, the literature of Buddhism, both Hinayâna and Mahâyâna, the Kâvyas and other products of Vikramadityan era, the more important Purâṇas, and some of the Tantras. See the volumes on the History of Sanskrit Literature by Max Müller, Macdonell, Weber, and Horrwitz. Max Müller's volume was long out of print, but has been recently published by the Panini Office, Allahabad. See also the paper on *the Character and Origin of the Puranas* by Mr. B. C. Mazumdar in the *Modern Review* (Calcutta), Vol. XI, pp. 72-79, and *the Dynasties of the Kali Yuga* by Pargiter (Oxford University Press, 1913).

[4] See p. 268 of the Bengali translation of *Susruta* by Kaviraja Devendra Nath Sen.

[5] Prof. Yoges Chandra Roy's Bengali work as well as Tagore's *Manimâlâ*.

[6] See Chidambram Iyer's *Brihat Samhitâ* (1884), pp. 164-174. This work introduces us to the meteorological, agricultural, zoological, architectural, medicinal and astronomical ideas of the Hindus in the 5th and 6th centuries A.D, and "is one huge attempt to interpret the language of nature and ascertain its bearing on the fortunes of men and nations." Those who are interested in the influence of Geography on History will find this ancient Hindu scientist partially anticipating Bodin, Montesquieu, Hegel, Buckle and Bagehot by full one thousand years.

III. PÂLA-CHOLA OR TANTRIC PERIOD (800-1200 A.D.)

1. *Rasaratnâkara*[1] of Nâgârjuna (8th cent.), the Mahâyânist, treats of the extraction of the essence of vaikrânta, dissolution of gems (pearls, &c.), killing of diamond.

2. *Agnipurâṇa* (9th cent.) testifies to Tantric influence, treats of the examination of gems, enumerates 36 precious stones, describes 8 only as Mahâratnas.

3. *Garuḍapurâṇa* (9th cent.) testifies to Tantric influence, also treats of the examination of gems and enumerates them, mentions Turkey, considers 12 gems as principal, discusses the features to be noticed in a gem before estimating value.

4. *Agastyamatam* (later than Garuḍa, but previous to Viṣṇudharmottara) mentions Arab and Turkey, enumerates ten gems, recommends the use of nine gems for the propitiation of nine planets, is quoted in *Yukti Kalpataru*, mentions pushparâga, vaiduryya, gomeda, sphatika (quartz), and pravâla as five *uparatnas* or inferior gems, notices the aspects to be noted in a good gem.

5. *Viṣṇudharmottarapurâṇa* (10th cent.), really a part of Garuḍapurâṇa, bases its enumeration of precious stones on the *Agnipurâṇa* and examinations of them on the *Garuḍa*, mentions nine gems[2] as mahâratna.

6. *Jyotiṣaratnamâlâ* of Srîpati, the astronomer (10th cent.), enumerates the same nine gems as sacred to the nine planets that are mentioned in Sukranîti.

7. *Matsyapurâṇa* describes a huge lake with diverse gems, in its 128th chapter.

8. *Yukti Kalpataru* (11th cent.) quotes Garuḍapurâṇa and Viṣṇudharmottarapurâṇa as authorities, is similar to Agastyamatam in certain particulars regarding the examination of gems, gives technical terms used in *Ratna Sâstra*, treats of "horses, elephants, ornaments, flags, umbrellas, seats, ministers, ships," etc., besides jewels, and frequently quotes from an author of the name of Bhoja, mentions mâṇikya, vajra, vidruma, gomeda, muktâ, vaidurryya, indranîla and marakata as the eight principal gems.

9. *Ratnasangraha*[3] of Maharsi Simha (12th cent.) consists of only 21 slokas, but gives a brief description of all the gems, refers to the prosperity of Yavanas, does not mention vidruma.

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[1] Dr. Rây's *Hindu Chemistry*, Vol. II, pp. 8-9.

[2] According to Sukranîti the Mahâratnas are nine in number. About nine gems as favourites of nine planets, see sloka 21 of Adhyâya 2 of *Jâtaka Pârijâta*, translated by Subrahmaṇiya Sâstri and printed at Nirṇaya Sâgar Press, Bombay (1903), p. 24.

[3] Edited and published by Dr. Sen together with his Bengali monograph on precious stones.

IV. MODERN PERIOD (1200-1600 A.D.)

1. *Rasara-tnasamuchchaya* (13th-14th cent.?) mentions vaikrânta,[1] enumerates 27 sages skilled in alchemy, among whom Vyâdi[2] is one, enumerates and describes the gems as agencies which help the fixation or coagulation of mercury, treats of the process of reducing gems to ashes.

2. *Dhâturatnamâlâ* (14th cent.) treats of the properties of pearls, coral, diamond, and the modes of their incineration.

3. *Nighantu* of Madanapâla (14th cent.) has a few verses about gems also.

4. *Dhâtukriyâ* (16th cent.) gives the synonyms of pearls, coral, etc.

5. *Bhâvaprakâsa* (16th cent.) also refers to gems, discusses their effects as drugs, enumerates several new uparatnas or inferior gems.

6. *Râjanighantu* (17th cent.) recommends the use of gems for the propitiation of planetary deities[3], indicates Tantric influence, and treats of their medicinal effects.

From the foregoing history of mineralogical literature of the Hindus extending over 2,500 years, it would have been evident that there are two features which characterise it :—

(1) that it is a record of continuous growth : Indian mineralogical literature does not present the case of an arrested development but has grown from epoch to epoch, utilising and assimilating the new conditions[4] according to the changes in the cultural environment of the country, and displaying novel features according to the altered circumstances of the times.

(2) that, like every other branch of Hindu culture, it has been built up by the joint and cumulative effort of the people of the whole of India : Punjab, Gujrât, Râjputânâ, Madhyadeṣa, Bengal, Mahârâstra and Dâkṣiṇâtya. Each quarter has contributed to the growth and development of Indian mineralogical literature, according to its opportunities, by supplying either 'great masters' or commentators as the need arose. Thus among the heroes of Hindu medicine and mineralogy, Charaka belongs to the Punjab, Susruta is claimed by Punjab as well as Benares, Vâgbhata belongs to Sindh (Western India), Vrinda to the Deccan, Narahari Pandit is claimed by Kashmir, but belongs probably to Mahârâṣtra, Chakrapâṇi to Gauḍa (Bengal), Sârangadhara to Râjputânâ, Viṣṇudeva to Vijayanagara, Devadatta to Gujrât, Madanapâla to Kanauj, Mathanasinha to Malwa, and Bhâvamisra to some part of Madhyadeśa (*i.e.* the U. P.).

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[1] Prof. Yoges Chandra considers this to be the first mention of vaikrânta. But the discovery of Nâgârjuna's *Rasaratnâkara* has pointed to it some four or five centuries earlier.

[2] This Vyâdi has been mentioned in Garuḍapurâṇa as specialist in detecting artificial pearls.

[3] See the Hindi Edition (1883), p. 139-142. Published from Benares.

[4] For the 'original' features in the successive works of the so-called commentators, see the account of Sanskrit medical treatises in Kavirâja Birajâcharaṇa Gupta's Bengali work, *Vanauṣadhidarpaṇa* (Auddy Co, Calcutta, 1908), pp. 30, 33, 34, 35, 36. In this the author has presented a learned treatment of the History of Hindu medical literature, and has discussed the questions of priority, interpolations, &c., by reference to original texts.

SECTION 6.

General remarks on Metallurgy[1] *in Hindu life and thought.*

We shall first mention all the references in *Sukranîti* bearing on the subject of metals, whether (1) as indicating metallurgical, alchemical, medicinal or artistic and commercial uses made of them by the ancient Hindus or (2) as indicating their theoretical or scientific knowledge about the diverse properties of metals and their uses in society. A study of these references will give us (1) an estimate of certain aspects of the material civilisation of the Hindus, (2) an idea of the geographical influences in which portions of the work might have been composed, and (3) incidentally enable us to determine the age of certain parts by comparison with the other works on the subject, as described in the preceding section.

It may be remarked here that the "distribution" of the mines, metals, stones and gems mentioned in *Sukraniti* covers practically a chapter of the whole Economic Geology of Ancient and Mediæval India. The Himâlayan regions, Burma, Râjputana, the Deccan and the Indian ocean are the principal localities from which the minerals were derived in those days. Some of these regions have been identified, others not. It would appear that commercial intercourse was sufficiently active in promoting the formation of all-India 'markets,' or rather "world-markets" for the valuables. It is therefore very difficult to give a 'local' character to the mining and allied topics referred to in *Sukranîti.*

Extent and Importance.

On this subject of mining[2] in ancient India, the *Arthasâstra* of Kautilya is a fuller and more definite document than the work of Sukrâchâryya. The economic and financial condition of the Maurya times (4th—3rd cent. B.C.) is vividly mirrored forth in this treatise. "According to it, there were two classes of mines, *viz.* (1) ocean-mines and (2) land-mines. * * * The duty of the Superintendent of ocean-mines was to look after the collection of diamonds, and other precious stones, pearls, corals, &c. * * * The Superintendent of land-mines had to perform the difficult work of prospecting and discovering new mines on plains and mountain slopes. * * * Silver ores are those which have the colour of *sankha* and do not emit much foam and smoke. Similarly, we find mentioned the properties of the ores of gold, bitumen, copper, lead, tin, iron, &c. * * * The Brahmana who has committed heinous offence * * * may be condemned to the mines."

The fables and fairy legends[3] in which gold, silver and precious stones play an important part also tell their own tale. In the appendix to his

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[1] Birdwood's *Paris Universal Exhibition of* 1878, pp. 20-69 (2nd Edition).

[2] See the paper on *Some Glimpses of India in the age of Chandragupta* by Mr. Narendra Nath Law, M.A., B.L., in the *Modern Review* for April, 1911.

[3] See also Lalbehari Day's *Folk Tales of Bengal* (MacMillan & Co.) and Shaikh Chilli's *Folk Tales of Hindusthan* (Panini Office, Allahabad) for the stories, respectively, regarding the origin of rubies, and of the Seven Goldsmiths.

Indian Mythology[1] Mr. Fausboll remarks : "In all cases the greater part of the Folk-Tales, both on the whole and in many separate characteristics, point back to India[2] as the land of their birth. * * * And when the old Greek authors Herodotus, Ktesias, Strabo and Ælian speak of gold-digging ants * * * it is evident that these tales are only a reflection of the imaginative mind of India. Some of the principal elements in the fables are gold, silver and precious stones. * * * In India we read of serpents (nâga, sarpa) in ant hills full of gold (Panchatantra III, 5,10), of golden hamsas (Panchatantra III, 6, Jâtaka Nr. 136), of the Nâga who makes a present of jewels to the king who saved its life (Jâtaka Nr. 386), of the princess who will only marry one who has seen the golden city (Kathâsarit Sâgara V, 24), of the golden lotuses (K. S. S. V, 25), of Śiva's garden, of golden trees with branches of jewels and flowers and with clusters of pearls (K. S. S. IX, 52), and so forth.

How does it happen that precious metals and minerals play so important a part in India's tales (and therefore also in those originating from there) ? The simple reason is because India has always been richly endowed with the same.

An early proof of this fact we gather from the records of the ancient Greeks. Thus whilst Megasthenes relates that, whilst the land on its surface bears all kinds of cultivated fruits, it has underneath numerous veins of all sorts of metals, for it is in possession of much gold and silver, and not a little copper and iron, yea, even tin and other metals which are used in the manufacture of useful articles and ornaments, as well as implements of war. He further says that Taprobane (Ceylon) produces more gold and more large pearls than the continent of India, and people's raiment is interwoven with gold and ornamented with gems.[3] * * * Another proof is the numbers of mines still being worked in India. According to Constable's Hand Atlas of India there are about 59 gold mines, 14 silver mines, 34 diamond mines, besides 105 iron, 55 copper and 21 lead-mines. The great conquerors whose desire it was to reach India also give evidence of this. * * *

Considering these things, can we wonder that we in India find a God of Riches (Kuvera), a god for those riches that grow in the mountain and not those that grow in the fields ?

Precious stones and metals have also left their indelible marks on the Tamil classics of the Augustan age which, according to Mr. Aiyangar, should be placed in the 2nd century A.D. Two celebrated classics, the *Silappadhi-Kâram* (epic of the Anklet) and *Maṇimekhalai* (Jewel-belt), which incidentally bring before us a vivid picture of the political, religious, educational, economic and social life of the early Cholas, derive their titles, *dramatis personæ*, scenes and incidents from the morals and manners of people dealing in gold, rubies and jewels.

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[1] Luzac and Co., London, 1903, pp. 189-93.

[2] Benfey's Translation of *Panchatantra.*

[3] See footnote on p. 192 of *Indian Mythology.*

The author of the *History of Indian Shipping* quotes the following from "A geologist's contribution to the History of Ancient India" by Prof. Ball in the *Indian Antiquary* for August 1884: "Even in the Mosaic Period (1491-50 B.C.) precious stones which were to a great extent a speciality of India appear to have been well known." Prof. Ball also rejects the view held by Lassen, Heeren and others that gold (and silver) was not indigenous to India but was imported from abroad, *e.g.*, Tibet, Burma, and Africa.

The following evidence given by Mookerji derived from Seal's *The Chemical Theories of the Ancient Hindus* gives a bright picture of the economic mineralogy of Hindu India: "Broadly speaking, there were three great discoveries in applied chemistry to which India owed her capture of the world-markets: (1) the preparation of fast dyes for textile fabrics by the treatment of natural dyes like *manjistha* with alum and other chemicals; (2) the extraction of the principle of indigotin from the indigo plant by a process, which, however crude, is essentially an anticipation of modern chemical methods; and (3) the tempering of steel in a manner worthy of advanced metallurgy, a process to which the mediæval world owed its Damascus Swords."

Ornaments.

According to authors of the Sukra cycle, as to all Hindu writers, the Earth is full of wealth,[1] and Kuvera[2] is the deity presiding over it. They appreciate *Kuveratâ*[3] or the possession of wealth more than many other qualifications, though, of course, it is inferior to *Îśatâ* or over-lordship, *i.e.*, sovereignty. They would therefore enjoy the good things of this world and advise others to do it.

According to them ornaments constitute some of the important valuables[4] of the state, and the ruler should appoint females to look after them. These are some of the items among the gifts[5] of the king to his officers, and we are told that the good servant[6] is satisfied with those that he receives and does not hanker after things not given. The love of ornaments among Sukra's countrymen is also indicated by the frequent metaphorical[7] uses of the term in *Sukranîti.* Thus "the ornament, the kingdom, strength, learning, or wealth does not adorn a man so much as courtesy and gentleness. Speed in horses, splendour in jewels, mercy in kings, blandishments in prostitutes, sweet voice in singers, charity in rich men, prowess in soldiers, abundance of milk in cows, restraint in ascetics, eloquence in learned men, impartiality in councillors, truthfulness in witnesses, devotion in servants, good counsels in ministers, silence in fools, faithfulness in wives, are the proper ornaments."

Three uses of ornaments have been mentioned in the treatise:—(1) as valuables of the treasury and as marks of honour conferred on office-bearers, as we have just noted, (2) as decorations for the person of females;—"The woman should put on clothes, ornaments, jewels given[8] by the father-in-law, mother-in-law, husband, parents, brothers, uncles and relatives ;" (3) for adorning images of the *râjasika*[1] type. That ornaments are important items in the material life of the people is likewise shown by the distinct recognition of the social offence committed by those who use others' clothes, ornaments[2] gold, &c.

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[1] **Sukra I, 849-850, 857-858.**

[2] **Sukra I, 151, 160, 361-362**

[3] **Sukra IV, iii, 4-5.**

[4] **Sukra I, 703-704.**

[5] **Sukra II, 846-848.**

[6] **Sukra II, 12.**

[7] **Sukra III, 291-292, 471-479.**

[8] **Sukra IV, iv, 21-22.**

The following is taken from Râjendralâl's *Indo-Aryans* :—" In the *Nirukta* of Yâska and the grammar of Pâṇini not only ornaments, but names of various kinds of them are enumerated, and Manu defines the nature and duties of the caste whose special vocation was to manufacture them, and the punishment meet for fraudulent adulteration of gold. The old vocabulary of Amarasinha gives names for crowns, crests, and tiaras for the head, of rings, flowers and bosses for the ears ; of necklaces of one to a hundred rows, and of various shapes and patterns ; of armlets and bracelets ; of signet and other rings for the fingers ; of zones and girdles for the waist of both men and women ; as also of ornaments of bells, bands and chains for the legs and ankle." The sculptures of Bhuvaneswara and the bas-reliefs of Sânchi and Amarâvati exhibit specimens of a great variety of ornaments which have been described with illustrations by Râjendralâl.

The countrymen of Sukrâchâryya are thus neither barbarous people who do not understand the importance of valuable commodities and who have not the æsthetic sense to appreciate them as materials for decorative and utilitarian arts. Nor are they the Utopians who set no store by precious metals, but employ gold and silver for their vessels of baser use. We know that the Utopia or 'Nowhere' of Sir Thomas More is peopled by men among whom the wearing of gold is a reproach and where fetters of bondmen are made out of it. "Gold and silver, whereof money is made they do so use as none of them doth more esteem it than the very nature of the thing deserveth. And then who doth not plainly see how far it is under iron: as without the which man can no better live than without fire and water. Whereas to gold and silver nature[3] hath given no use, that we may not well lack : if that the folly of men had not set it in higher estimation for the rareness' sake. * * * And these metals, if they should altogether at once be taken from the Utopians no man there would think that he had lost the worth of one farthing."

These are the teachings of the socialistic and the political reformer of England in the 16th century. But the authors of the Sukra cycle are not revolutionary idealists running away from the troubles and imperfections of the existing state of things into an Ideal Republic of nowhere. They are sane men dealing with the world as it is, and have to recken with the human passions as they are. They therefore do not taboo wealth and enjoyments from their scheme of life, but try to regulate them as far as necessary.

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[1] Sukra IV, iv, 163-164.

[2] Sukra IV, v, 151-152.

[3] See the chapter on " journeying or travelling abroad with diverse other matters cunningly reasoned " in the *Utopia* of Sir Thomas More (English translation).

Sukra on Mining and Metallurgy.

In this pursuit of wealth they do not scruple to disembowel the " unsunned " treasures of the underground universe and search its entrails wide and deep. It is because of this that we have the very old European tradition about the 'wealth of Ind' in the gorgeous east which " with richest hand showers on her kings barbaric pearl and gold." Mining becomes thus one of the occupations of the people, and the rulers have a right to its yield. Among other functions the *Sumantra*[1] or Finance Minister of the state has to study the amount of revenue realised through mines. This income from the mines is known to be *Itara* or other than *pârthiva* (*i.e.*, terrestrial), according to the Public Finance of the Sukra statesmen. " Duties, fines, royalties on mines,[2] prices and contibutions, etc., are known to constitute non-terrestrial income according to writers and specialists." The mention of mines[3] among the regions of Sulka or duty which is the king's share from the buyer and the seller points also to the importance of mining as an item that feeds the Income-schedule of the State Budget. So we read : "The king should realise from minerals[4] at the following rates ; half of gold, one-third of silver, one-fourth of copper, one-sixth of iron, tin and lead, half of gems, half of alkalies ; after the expenses have been met." The ruler is also advised to appoint miners[5] to their proper works and store by minerals[6] carefully for emergency or other purposes.

Not only the miners, but goldsmiths, coppersmiths and other metal-workers as well require patronage and " protection " of the State. " The king should always keep in his kingdom the tools and implements of the metal-workers[7] after inspecting them " and find occupation for " those who make lighter machines, gunpowder, arrows, cannon-balls, and swords, and construct various tools and implements, arms and weapons, bows and quivers, etc.; those who prepare ornaments of gold, jewels, etc., builders of chariots, stone-carvers, blacksmiths, and those who enamel metals."

This enumeration of the industries connected with metallurgy to be encouraged by the king involves also a good deal of legislation on the subject. Thus among the laws to be promulgated among the people one is that " falsehood must not be practised by anyone with regard to the standard of weights and measurements, currency, some kinds of metals[1] etc." So also "the man who adulterates[2] metals deserves double the punishment." State intervention in Industry cannot be one-sided. If it is the duty of the ruler to maintain the artists and artisans and thus "protect" them with work and wages, it is also his lookout to see that the people should be protected *from* them. Hence guardianship of the state must be exercised against the dangers of false and counterfeit coinage and the passing off of base metals for genuine and high class commodities.

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[1] Sukra II, 211-212.

[2] Sukra II, 671-672. The *pârthiva* or terrestrial income accrues from the rights of sovereignty over lands, rivers, seas, lakes, tanks, wells, &c.

[3] Sukra IV, ii, 212-213.

[4] Sukra IV, ii, 233-235. Here I beg leave to correct my translation on p. 148 of Vol. XIII, Parts I and II of the Sacred Books of the Hindus Series. *Vanga* is tin and not zinc. The words for zinc in *Sukraniti* are *rangaka* and *jasada*. The reader is requested to understand these three lines as translated in this section.

[5] Sukra II, 404-405.

[6] Sukra IV, ii, 60-63.

[7] Sukra IV, iv, 85-87.
Sukra II, 394-398.

An account of the fabrication of imitation-jewellery in Hindu India has been preserved in the dramatic literature of the 1st cent. B. C. In the *Troy Cart* of Sudraka a question is raised about the identity of certain ornaments produced in a court of justice. We quote the following from that play published in Wilson's *Hindu Theatre* :[3]

"*Judge.*—Do you know these ornaments ?

Mother.—Have I not said ? They may be different, though like. I cannot say more ; they may be imitations made by some skilful artist.

Judge.—It is true. Provost, examine them ; they may be different, though like; the dexterity of the artists is no doubt very great, and they readily fabricate imitations of ornaments they have once seen, in such a manner that the difference shall scarcely be discernible."

The examination of metals as to their genuineness and worth thus becomes an important function of the state as well as people. The Sukra statesmen know very well that metals[4] may be made to acquire artificial character, and have mentioned the preparation of artificial gold[5] as an art or one of the sixty-four *kalâs*. The testing[6] of minerals must therefore be an important branch of learning and is referred to as a *kalâ*. And the wise men[7] are those who know how to determine their value by carefully examining them. One test is given in the following lines : "If two pieces[8] of a metal—one pure and the other suspected as alloy—be successively passed through the same hole, and threads of equal lengths be drawn out of them and weighed, and if the weights of both are equal, then the metal[1] is unalloyed, otherwise not."

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[1] Sukra I, 587-592.

[2] Sukra IV, v, 660. So also Manu advises the king to cause a dishonest goldsmith to be cut to pieces with razors. IX, 292.

[3] Wilson's *Hindu Theatre*. II, p. 85.

[4] Sukra IV, ii, 171-172. where we are told that gems also have defects, but they are 'natural.' This preparation of artificial metals, however, does not seem to be the transmutation of "base" metals, *e.g.*, copper or lead into gold or silver, but the manufacture of imitation gold or silver, *i.e.*, of substance having their lustre, or the laying of gold or silver deposits on copper and other metals. Prof. Yoges Chandra Ray proves this in his *Ratna-Parikṣâ* by examining the extracts from *Rasaratna-samuchchaya* and *Garuḍa-purâṇa*.

[5] Sukra IV, iii, 178. This does not refer to the alchemical transmutation of base metals into gold, but the manufacture of imitation gold.

[6] Sukra IV, iii, 180.

[7] Sukra IV, ii, 171-172.

[8] Sukra IV, ii, 178-179. Specialists would do well to examine the accuracy of this test in a laboratory.

We have already referred to some of the industries connected with metal-work.[2] The use and manufacture of seals and emblems have been mentioned in several places.[3] Thus, "one should put on the clothes, uniforms and emblems granted by the king;" "they should put down their seals over it at the end of the writing;" "the king should give to each cultivator the deed of rent having his own mark (seal)." These and other manufactures are suggested also in the enumeration of the *kalâs*, *e.g.*, (1) melting,[4] powdering, incineration &c., of metals, (2) the knowledge of the mixtures of metals and herbs or medicinal plants, (3) analysis and synthesis of metals, (4) preparation of alloys, (5) alkalies and salts; (6) cleansing, polishing, (7) dyeing of stone and metal vessels, (8) making of ornaments, (9) enamelling, (10) preparation of tools and implements, &c."

Metals thus occupy a very important place in several aspects of the secular life of the people as described in *Sukranîti.* They have a religious bearing also. For the "images of gods[5] are made of sands, pastes, paints, enamels, earth, woods, stones and metals," the strongest being those of metals. This religious branch of the metal-craft carries with it a very severe responsibility. It compels the artist to be very particular about his workmanship and to study the canons of Hindu art, in order to conform to them as closely as possible. For, though defects may be allowed in images of a temporary character, *e.g.*, those made by painting, drawing, or of sand, earth &c., and in the natural images of gems and stones picked up in rills and hills, those which are to be durable must be tested very minutely and must satisfy the condition of good Art. Thus we are told that "one should consider the defects of proportion in images of stones[6] and metals only." If the sculptor bungle with the work entrusted to him and do not construct the image according to the prescribed measurements of the limbs, his wealth and life would bejeopardised and his misery[7] will daily increase.

Metals and stones in minor arts.

We thus see that, besides the important part played in commercial, social, religious, and literary lives of the people of India, the metals and gems have had their influence on Indian art also. Architecture as well as sculpture of Hindusthan bear abundant testimony to the treatment of *dhâtus* and *ratnas* by artists.

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[1] See also the rule laid down in *Sukraniti* about the relation between weight and volume. IV, ii, 177.

[2] Notice also the references to the manufacturers of badges, sceptres, bridges, coins, &c., Sukra II, 853-855; I, 722.

[3] Sukra II, 490-491; II, 739-740; IV, ii, 247.

[4] Sukra IV, iii, 145-150, 167-168, 179-193.

[5] Sukra IV, iv, 147-151.

[6] Sukra IV, iv, 305-309.

[7] Sukra IV, iv, 157-159.

In their historical works Fergusson, Râjendralâl, Havell, Vincent Smith, and Manomohan Ganguly have sufficiently noted the manipulation of metals and gems in Hindu art. The tenth chapter of Vincent Smith's work, that on Hindu minor arts, deals, among other things, with the following topics relevant to the points discussed here: (1) coinage, (2) gems, seals and jade, (3) jewellery, (4) reliquaries and gold images, (5) silver pateræ and bowls, (6) copper-vessels.

The use of metals for the fabrication of domestic vessels in Hindu India is thus described by Dr. Râjendralâl in the paper on *Furniture, Domestic Utensils* etc., in *Indo-Aryans*, Vol. I:—"The Rig-Veda alludes to golden cups; The Sutras and the Mahâbhârata frequently refer to vessels of other than gold and clay. Tvâshta, the Vulcan of the Hindu pantheon, was the most celebrated artificer of metallic arms, but the Ribhus greatly excelled him in the formation of sacrificial vessels of wood and metal.

In a mediaeval work, the *Kâlikâ Purâṇa*, plates made of gold, are described to remove excesses of the three humours, and promote the strength of vision; those of silver favourable to vision and inimical to bile, but calculated to increase the secretion of wind and phlegm; those of bronze, agreeable and intellectual, but favourable to undue excitement of blood and bile; those of brass, wind-generating, irritating, hot, and heat-and-phlegm-destroying; those of magnetic iron, most beneficial in overcoming anasarca, jaundice and anæmia. The *Yuktikalpataru* recommends that drinking cups for royal personages should be made of gold, silver, crystal or glass."

The *Periplus* describes Muziris, a port on the Arabian coast, whence Romans used to carry pearl, ivory, diamonds, rubies, topazes, stibium, coral, flint, glass, brass, arsenic and lead. Mr. Aiyangar in his *Ancient India* quotes the Tamil classic *Ahanâ-nûru* to prove the flourishing condition of "Musiri to which come the well-rigged ships of the Yavanas."

SECTION 7.

The Doctrine of Seven Metals.[1]

Sukraniti mentions seven metals *viz.*, suvarṇa (gold), rajata (silver), tâmra (copper), vanga (tin), sisa (lead), rangaka (zinc) and loha (iron) under the name of *dhâtus*; and two alloys under the name of *sankaras*, *viz.*, kâmsya *i.e.*, bronze or bell-metal (which is made of vanga and tâmra) and pittala or brass (which is made of tâmra and ranga).

The names, number, and classes of metals as given in *Sukraniti* are not, however, the same as in other works on the subject in Sanskrit literature. The chemico-medical treatises that treat specially of the minerals are very diverse in the matter of enumeration, classification and synonyms. Each represents in fact to a certain extent the cultural characteristics of the place or epoch in which it was composed.

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[1] Sukra IV, ii, 171-176. The reader is requested to note the following changes in my translation of Sukraníti: He may read bell-metal for bronze on page 144, and should understand zinc wherever there is tin and tin wherever there is zinc. The word *vanga* is generally a term for tin. But in *Dhâtukriya* of the 16th century *ranga* is also used to denote tin. See śloka 12 in Dr. Ray's edition of Sanskrit Text. That is perhaps the only use. So I take *ranga* as the term for zinc (and not tin, as in the Translation). See Prof. Yoges Chandra's *Ratnaparikṣâ*.

The word *rangaka*[1] which has been taken here as a synonym for zinc has been used only thrice.[2] Another word has also been used as a synonym for *rângaka or* zinc. This is *jasadâ.*[3] But the terms rangaka and jasada are not to be met with in older literature, nor is even the substance which is denoted by these terms mentioned there as one of the metals.

Vedic Period.

In Vedic literature we meet with six or perhaps seven metals : (1) Gold[4] called by the names of Candra, Jâtarûpa, Suvarṇa, Hârita, and Hiraṇya, (2) Silver called Rajata,[5] (3) Copper called Loha,[6] (4) Tin called trapu[7] (5) Iron[8] called Ayas, kriṣṇayasa, syâma, (6) Lead called Sîsâ[9] Perhaps bronze is also suggested.

According to Messrs. Macdonell and Keith, the exact metal denoted by the word *ayas* when used by itself, as always in the Rigveda, is uncertain. As favouring the sense of bronze rather than that of iron may be cited the fact that Agni is called *ayo-damstra*, (with the teeth of *ayas*) with reference to the colour of his flames, and that the car-seat of Mitra and Varuna is called ayasthuna (with pillars of ayas) at the setting of the sun. Moreover, in the Vâjasaneyi Samhitâ ayas is enumerated in a list of six metals : gold (hiraṇya), ayas, syâma, lohâ, lead (sîsa), tin (trapu). Here syâma (swarthy) and loha (red) must mean iron and copper, respectively ; ayas would therefore seem to mean bronze. In many passages in the Atharvaveda and other books the ayas is divided into two species—the syâma (iron) and lohita (copper or bronze). In the Satapatha-Brâhmaṇa a distinction is drawn between ayas and lohayasa which may either be a distinction between iron and copper or between copper and bronze. In one passage of the Atharvaveda[10] the sense of iron seems certain. Possibly, too, the arrow of the Rigveda which had a tip of ayas was pointed with iron. Copper, however, is conceivable, and bronze quite likely. The Satapatha-Brâhmaṇa states that if "well-melted" it is like gold, referring evidently to bronze.

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[1] For the antiquity of the word and its history see *Susruta*, *Madanapâla* and *Dhâtukriyâ* referred to subsequently.

[2] Sukra IV, ii, 173-175, 176, 183, 144.

[3] Sukra IV, v, 646-648, 658-659.

[4] Max Müller and Keith's *Vedic Index* Vol. 1, 254, 281, 31 ; II, 459, 498, 504, 505.

[5] *Vedic Index* Vol. II, 197.

[6] *Vedic Index* Vol. I, 31 ; II, 234.

[7] *Vedic Index* I, 81, 826.

[8] *Vedic Index* I, 81, 82, 151.

[9] *Vedic Index* I, 81, 452.

[10] V. 28, 1, see Vol. I, p. 272 Harvard Oriental Series.

The following is taken from Dr. Ray's *History of Hindu Chemistry* :[1] 'In Vedic literature iron proper seems to be designated *krisṇâyas* or the black metal,[2] and copper by *lohitâyasa* or the red metal.

Besides gold and silver, several other metals, *e.g.*, iron, lead and tin are mentioned in the white Yajurveda XVIII, 13. In the Chhândogya Upaniṣad IV, 17, 7, we also read "As one binds gold by means of lavana (borax), and silver by means of gold, and tin by means of silver, and lead by means of tin, and iron by means of lead, and wood by means of iron, and also by means of leather."

At least three metals are mentioned in Atharvaveda,[3] used for amulets to be put on against demons, for long life or for safety. These are gold, lead and iron.

Vedic literature thus testifies to the antiquity of Hindu metallurgy and to the varieties of nomenclature used in designating the metals.

Charaka-Susruta.

The Charaka mentions suvarṇa and five *lohâs* or metals, but does not name any.[4] Kavirâja Avinâs Chandra Kaviratna calls them silver, copper, lead, tin and iron. It is to be noted that the word *dhâtu* does not occur here, and that *lohâ*[5] is a generic name for metals, almost like *ayas* in Vedic literature.

The Susruta[6] mentions six metals under the heading of *trapu* (tin) *order* among the 37 classes of drugs enumerated in Chapter XXXVIII of Sutrasthâna. These are trapu (tin), sisâ (lead) tâmra (copper), rajata (silver), krisṇaloha (iron), and suvarṇa. But in Chapter LXIV, while treating of the *Lavanas*, Susruta mentions 7 metals[7] and describes their properties. The additional one is kâmsya or bell-metal. A new name is also introduced. This is *ranga*, perhaps a synonym or misprint for *vanga*, which is trapu or tin. But if *ranga* be the correct reading, we have here the authority for the use of the term in the same sense of tin in *Madanapâla-nighantu* and *Dhâtukriyâ*, works of the fourteenth and sixteenth century respectively.

The doctrine of six metals continued.

At least five metals are referred to in Mahâbhârata,[8] *viz.*, gold, silver, copper, iron and *Kâmsya*. *Amarakoṣa*, a work not later than the 6th century

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[1] Vol. I, first edition, p. 83.

[2] Book I, 16, 35 ; *Book* V, 28.

[3] The Susruta also differentiates iron by the term *Krisṇaloha* (black metal), though copper is known by its proper name *tâmra*.

[4] See the Sanskrit text edited by the Kavirajas Devendranath Sen and Upendranath Sen (1897), p. 7.

[5] In the section on the *Doctrine of Nine Gems*, the two pairs of convertible terms (1) Dhâtu and loha, and (2) Ratna and maṇi have been treated historically.

[6] See p. 181 of the Bengali translation of *Susruta Samhitâ* by Kavirajas Devendranath Sen and Upendranath Sen (1900).

[7] See the Bengali translation, p. 968.

[8] Prof. Yoges Chandra Ray's *Ratnaparikṣâ* (1904), p. 154.

A.D., mentions gold, silver, copper, kâmsya, pittala (brass), iron, tin, mercury and *sauviranjana* (*stibnite*). Pittala or brass is thus at least as old as the sixth century. It is also mentioned by Varâhamihira of the same age. The use of mercury as a drug is also at least as old as Varâhamihira.

The *Rasârnava*[1] of Nâgârjuna (8th cent.) mentions six *lohas* or metals: suvarṇa, rajata, tâmra, *tikṣṇa* (iron), vanga (tin) and *bhujangama* (lead). Here we get tîkṣṇa and bhujangama, two new names for substances used since Vedic times.

The *Rasaratnâkara* of the same author gives new names to the metals. Thus silver is *sitâ* and *târa*, copper is *sulva*, lead is *nâga*.

The *Rasahridaya*,[2] a work of the eleventh century, uses *nâga* for lead, *tikṣṇa* for iron, and gives three classes of metals: (1) noble, *e.g.*, gold, and silver, (2) essential or substantial, *e.g.*, copper, brass (âra), *tikṣṇa* and kânta (varieties of iron), and (3) those which emit fœtid odours, *e.g.*, lead and tin.

The *Rasaprakāsasudhâkara* of the thirteenth century gives the name *târa* for silver. The *Rasakalpa* of the same age mentions six *lohas* or metals, *e.g.*, hema (gold), rupya (silver), arka (copper), vanga (tin), *ahi*[3] (lead) and lauha (iron). Varta and others are also mentioned as alloys.

The 14th century.

The *Rasaratna-samuchchaya* of the fourteenth century, which quotes passages *verbatim* from Rasârṇava and other authorities, begins its Fifth Book that on *lohas* or metals with the following words: 'The *suddha* or pure metals are kanaka (gold), rajata (silver) and loha (iron). The *Puti lohas* (those emitting fœtid odour) are two, *viz.*: nâga (lead) and vanga (tin). The *misra* or alloys are three in number, *viz.* pittala (brass), kâmsya (bell-metal), and varta. The *Loha* metal is loha or iron, and often conveys different meanings.' Here we have five metals divided into two classes, and the 3 alloys regarded as forming a class by themselves. This enumeration, nomenclature and classification of metals may be compared with those in *Sukraniti*, thus :—

(1) *Loha* is the generic name for metal in R. R. S. whereas *dhâtu* is the word for it in Sukra.

(2) Sukra includes *rangaka*, a new metal among the pure metals and thus gives the number seven, whereas according to R. R. S. the number is only five, but six later.

(3) The alloys are two in *Sukraniti*, but three in R. R. S., including *vartaloha* 'which is produced from kâmsya, copper, pittala, iron and lead and is thus an alloy of five matals.'

The *Rasaratna-samuchchaya* often uses *ayas* for iron, and mentions *tikṣṇa* and *kânta* as two of its three species. In Book X, 70, it refers to the six metals, but mentions only two alloys like *Sukraniti*. *Trapu* is the word used here for vanga or tin.

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[1] See Sanskrit Text edited by Dr. Ray, Vol. II, 89, 90.

[2] See Sanskrit Text edited by Dr. Ray, also *Hindu Chemistry*, Vol. II, p. 11.

[3] See Dr. Ray's edition of the Sanskrit texts in *Hindu Chemistry*, Vol. II.

The *Sârangadhara*[1] of the same age recognises seven metals, though it does not mention zinc, but later names nine metals including two alloys, brass and bell-metal, after the nine planets.

The fourth chapter named *Suvarṇavarga* of *Madanapâla-nighantu*, another work of the 14th century, however, mentions suvarṇa, rupya, tâmra, kâmsya, pittala, ranga or vanga, jasada (zinc), sîsa, lohâ (iron), sulphur, mercury, gems, etc. It gives the synonyms of these metals also, and treats of their properties. It is to be noted that ranga, vanga and trapu are used as synonyms to indicate tin; and jasada is described as being '*ranga-sadrisa*' *i.e.*, like ranga or vanga.

Madanapâla and Sukra thus agree in almost all particulars. Both mention the same nine metals. Madanapâla does not classify them, and enumerates some more, *e.g.*, sulphur, mercury, abhra, etc., while *Sukranîti* regards the alloys, brass and bell-metal as forming a category distinct from the unalloyed seven. The only real difference is that Sukra takes *rangaka* as something different from *vanga* (which has been always known to be tin). From the composition that he gives of pittala (alloy of copper and *rangaka*) we find no difficulty in identifying his *ranga* with zinc. *Sukranîti* requires to be noted on another point also. This is about the use of the term *jasada*, which has been given in Madanapâla to designate zinc. The *jasada* and *rangaka* of *Sukranîti* are thus synonyms denoting the same substance—zinc.

Though it is not rational to argue anything from mere non-mention we may tentatively conclude, subject to the fallacy of *argumentum ex silentio*, that the portions of *Sukranîti* dealing with metals must be attributed to people living about or after 1374, the year of the composition of Madanapâla-nighantu,[2] but not earlier.[3]

Subsequent notions.

The same seven metals including zinc are mentioned in Dhâturatnamâla, also, another work of the same epoch which gives *Kharpara* the name of *jasada*; and in the *Dhâtukriyâ* of the 16th century which gives the synonyms of all the metals. In this last work zinc is called jâsatwa, jasa-dâyaka, rupya-bhrâtâ (brother to silver), charmaka, kharpara, rasaka;[4] and the two alloys mentioned in *Sukranîti* are also enumerated. The tradition of the seven metals is continued in the Bhâvaprakâsa of the 16th century which describes tin by the name of *ranga* and zinc by jasada. But *Râjanighantu* of the 17th century does not mention zinc, though it enumerates the two alloys and seven metals. *Kṣudrasuvarṇa* is mentioned in the place of zinc.

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[1] See *Hindu Chemistry*, Vol. II, LXX.

[2] See Text edited by Pandit Jivânanda Vidyâsagara (1875), pp. 50-52.

[3] It would be interesting to observe that in Europe also the Doctrine of seven metals held its sway for long. It was supposed that there was a mystic connexion between the planets and the metals. Thus gold, the prince of metals, was the favourite of Sun, the lord of the firmament, liquid mercury was the favourite of the planet Mercury, the changeful deity; and so on. This idea of the connexion between planets and things of this world will be treated of in the section on the *Doctrine of Nine Gems*.

[4] 'Rasaka and Kharpara are the names generally applied to the mineral calamine.' Dr Ray.

Whether the authors have reckoned only six *lohas* or seven (as since 14th century downwards), the principle has been to count the pure or unalloyed metals only. Later, the doctrine of seven pure metals is replaced by that of eight and nine metals, without reference to their character as pure or alloys. Thus Dr. Râmadâsa Sen quotes a *Vaidyaka* text which regards gold, silver, copper, iron, *Kusya* (zinc), mercury, ranga (tin) and lead as the eight principal *dhâtus*. Another version of the tradition of eight metals is supplied by *Dânasagara* which gives gold, silver, *kâmsya* (the alloy bell-metal), copper, lead, ranga (tin), iron and raita (brass).

The *Sukhabodha* considers nine metals to be chief, *e.g.*, gold, silver, âra (brass), nâga (lead), copper, ranga (tin), tikṣṇa (species of iron, steel), kâmsya (bell-metal) and kânta lauha (species of iron). This list does not give zinc, mentions iron twice, and includes the two alloys which are known to the author as such, according to Dr. Sen.[1]

It is to be noted, moreover, that in the extracts from Bhâvaprakâsa and other works just quoted, the word *ranga* is used not for zinc (as, in *Sukranîti*, a synonym for jasada), but for vanga, trapu or tin (as in Susruta, Madanapâla, and Dhâtukriyâ).

Another fact should draw our attention. In the whole literature on the subject from the earliest times, mercury has not been mentioned in any list of metals, except in the above quotation from vaidyaka; though its use as a medicinal drug has been known since at least the epoch of *Sârangadhara-Sangraha* (14th century),[2] according to Dr. Dutt, but according to Dr. Ray, since at least the age of Varâhamihira[3] (6th century), who mentions 'iron and mercury among the aphrodisiacs and tonics' in *Brihat Samhitâ.*

Explanation of the number Seven.

The foregoing account will have shown that the '*Doctrine of Seven Metals*' represents only certain stages in the story of metals in Indian literature. Allowing for the fallacy of *argumentum ex silentio*, we have placed it in the epoch between the 14th and 17th century. For an explanation or 'philosophy' of this doctrine we may hazard a hypothesis. Perhaps it is to be sought in the Theory of Mystic Numbers like three, seven, nine, etc., which has had its day in both eastern and western thought. So far as seven is concerned, in India we have the seven Rishis, the seven mouths or tongues of Fire, the seven *Kulaparavatas* or mountains, the seven rivers, the seven planets or *grahas*, the seven heavens, the seven seas (salt, curd, milk, etc.), the constellation of seven stars called saptarṣimandala, the seven immortals (*chirajivinah*) etc. The tradition of seven being the number of principal metals may have had its origin in the same tendency of people to tabulate important facts and things of the world according to one or other of the numeral orders. Or, originally, the doctrine may have had nothing to do with mystic numbers—it may have been the result of a simple observation of mineralogical facts.

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[1] See Ramadasa Sen's *Ratna-rahasya*, a Bengali work already referred to.

[2] 'The oldest work containing a detailed account of the calcination or preparation of the different metals (such as gold, silver, iron, mercury, copper, tin and lead) is, I believe, a concise treatise on medicinal preparations by Sârangadhara.'—Dr. Dutt's Preface to his *Materia Medica of the Hindus.* Dr. Dutt believes that mercury was just coming into use in Chakrapâṇi's time (11th century).

[3] *Hindu Chemistry,* Vol. I, xlvii. First Edition. 'The *Rasârṇava* of Nagarjuna (8th century) is, as the name implies, the 'sea of mercury' and extols the virtues of mercury and its various preparations.' The discovery of this work by Dr. Ray also falsifies the notion of Dr. Dutt and testifies to the antiquity of the internal use of mercury.

The arguments of Dr. Ray to prove the indigenous origin of Indian alchemy incidentally throw important light on the doctrine of seven metals both in the east and the west, and demonstrate the absence of any mystic connexion between planets and metals in Hindu thought. 'One of the most favourite doctrines of the neo-Platonists was that the metals were engendered in the womb of the earth under the influence of the planets. According to Olympiodorus (5th century A.D.) lead is begotten by Saturn, electrum by Jupiter, iron by Mars, copper by Venus, tin by Hermes, gold by the Sun and silver by the Moon. * * * Varâhamihira's *Brihat Saṃhitâ*, if anything, is a repertory of astrological notions. In vain do we look even there for any chance and solitary reference. The alchemical literature of India is equally silent about it. * * * The old Greek writers repeatedly refer to the mystic relationship between the seven planets and the seven metals. * * * The Arabs who adopted many of the Greek doctrines of alchemy also represented the seven metals by the seven planets. * * But in Sanskrit literature we find invariably six metals. It is only in the Sârangadhara and other later works that we find seven metals; * * but this author adds two more to the list and quietly lays down that there are nine metals, which derive their names from the nine planets.[1] * * Râjputana had been overrun and occupied for a brief period by the Musalman conquerors shortly before the time of Sârangadhara, and it is reasonable to suppose that he had gleaned some astrological notions from that quarter.'[2]

Finally, it may be observed that while in India the doctrine of nine gems was influenced by that of nine planets, the doctrine of seven metals was influenced, if at all, by that of *seven* planets.

SECTION 8.

The Economic Mineralogy of Sukrâchâryya's *India.*

(*a*) *The Pure Metals.*

References to gold as to other minerals in *Sukraniti* are commercial, financial and industrial. The statesmen of the Sukra cycle are concerned with them principally as marketable commodities and possessing some 'value.' Identification of these metals, examination of their genuineness, and determination of their 'price' in terms of money are the chief topics dealt with by Sukrâchâryya. A study of these references will thus be a main source of our knowledge of the commercial geography and economic history of India in ancient times, and incidentally of mining,[1] minting, metallurgy and other industries.

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[1] See the discussion in the section on the *Doctrine of Nine Gems.*

[2] Dr. Ray's *Hindu Chemistry* Vol. II, lxxxvi—xc.

It is not safe, however, to infer anything as to the *locale* of *Sukraniti* from the references to mines and metals, as (i) they are more or less of a vague character and (ii) the mineral products are very mobile and easily transportable, commanding what is known as the 'world-market.' Perhaps the definite references to the rates of royalty, remuneration and prices apply to the ideas generally prevalent rather than to those of any one mineralogical zone, *e.g.*, Râjputana, Deccan, &c.

i. *Gold.*[2]

The lustre and brilliancy of gold are well-known to the Sukra authors. Gold,[3] according to them, is the best metal. Its appreciation as an ornament used in decorating the person of human beings is referred to. The making of ornaments with gold is a *kalâ.*[4]

Testing.

There are two methods by which gold can be identified. The first method consists in differentiating it from other metals.[5] The test is given in the rule that "gold of the same weight as other metals is small in volume. Others are bulky." The density of gold being high, there will necessarily be great weight in small bulk. Thus, though the gold coin *mohur* and silver rupee have the same weight, the mohur is smaller in size than the rupee. The second method consists in differentiating pure gold from imitation gold or an alloy or some other metal. The test as described previously is conducted in the following way: "If two pieces of a metal,[6] one pure and the other suspected as alloy, be successively passed through the same hole, and threads of equal lengths be drawn out of them and weighed, and if the weights of both are equal, then the metal is unalloyed, otherwise not." Thus, as Prof. Yoges Chandra Ray says, if the weight of, say, copper wire be 8, that of gold wire of the same length (drawn through the same hole and hence having the same width) would be 19. Or take copper and gold of the same weight, and draw two wires through the same hole; then if the length of gold wire be 8, that of the copper wire would be 19. Both these tests of Sukrâchâryya are thus dependent on the theory of Specific Gravity.

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[1] For an account of mines and minerals in Modern India, see the Indian Empire in the *Imperial Gazetteer of India* Series. Descriptive and Economic Volumes (I and III).

[2] Principal Burns in his monograph on *Gold and Silver work in the Bombay Presidency* (1904) has dealt with the subject a bit historically. Cf. also "Paris Universal Exhibition, 1878: Handbook to the Indian Court," by Sir George Birdwood, pp. 59-61, second edition.

[3] Sukra IV, ii, 173-175.

[4] Sukra IV, iii, 179.

[5] Sukra IV, ii, 177.

[6] Sukra IV, ii, 178-179.

The use of gold in art for decorative or utilitarian purposes necessarily introduces difficulties in the matter of testing the genuineness or otherwise of the material worked upon. The following are the rules for the guidance of people : (1) when one hundred *palas* of gold[1] is taken and melted, it is pure if it still remains one hundred palas, and does not become less. (2) In articles of the best workmanship gold[2] is lost by a two-hundredth part of itself, (while silver by a hundredth part) ; and if soldered by using good material, the weight is increased by a sixteenth part. Having examined the soldering and the workmanship, the increase or decrease should be determined.

The Sukra statesmen are of course specially interested in the ability to distinguish the values of gems and metals and differentiate the genuine from counterfeit coins or imitation from pure metals. And the testing of the worth of gold was certainly a very common phenomenon in Sukra's times, as it still is. For the examination of the genuineness of precious metals supplied an analogy with the examination of the character of officers and servants. Thus we read : "Just as gold[3] is tested by experts by having reference to the lightness or heaviness of weight, colour, sound, etc., so also one should examine servants or officers by reference to their work, companionship, merits, habits, family relations, &c."

As Wealth and as Money.

Several references in *Sukranîti* point to gold and silver, specially the former being the 'measure' or 'standard' of value. Its functions as the 'medium of exchange' is also frequently indicated. Thus among the things to be studied by the king for four *muhurtas*[4] before meals we find gold[5] mentioned along with grains, clothes, jewels, &c. Gold is here to be taken either as a valuable commodity (Bullion) *i.e.*, a form of 'wealth' hoarded in the treasury like grains in the granary, or as coins that have come into the treasury in the process of circulation as 'money' *i.e.*, medium of exchange.

The same may be said of the reference to gold in the rule that advises the king to appoint separate officers to look after elephants, horses, chariots, infantry, cattle, gold,[6] jewels, silver, clothes, &c. It is not difficult to appreciate the importance of having separate officers for gold, jewels and silver. But perhaps there is to be only one officer for all these valuables, whether as bullion or as money, as distinguished from other officers appointed for horses, chariots, &c.

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[1] Sukra IV, v, 645. One pala is 8 tolas. One silver pala is therefore Rs. 8.

[2] Sukra IV, v, 649-652.

[3] Sukra II, 106-109.

[4] 1 Muhurta=48 minutes.

[5] Sukra I, 561-562.

[6] Sukra II, 237-238.

That there is to be one officer for these precious metals and stones is clearly indicated in the following lines which describe the qualification of the people in charge of the department: "That man is to be in charge of jewels, gold, silver, and coins who can distinguish their values by their weight, shape, lustre, colour and resemblances." The *mudrâs*[1] or coins may be taken separately as an independent item or as a compound with *svarṇa* and *rajata*, in which case the idea of gold and silver money or currency is unmistakably suggested.

The use of gold in both the functions of money as the standard of value as well as the medium of exchange is also referred to in the following lines:

(1) Houses[2] are meant for gold, jewels, silver, *niṣkas*[3] or coins etc., and other purposes on which expenditure is technically called *bhogya.*

(2) "*Dravya*[4] (lit. goods) is silver, gold, and copper coined for commercial purposes." The term 'Dravya' may be taken to be the equivalent of what is technically called 'Money.'

(3) "Silver, gold and other booty[5] belong to him who wins them. The ruler should satisfy the troops by giving them those things with pleasure, according to the labour undergone.

Uses of Gold.

Besides the mention of gold as ornaments, valuables and coins, we meet with its use for various other purposes. Thus among the ten requisites in the administration of justice[6] there is the mention of gold which is intended to be the material by which the witnesses are to swear oaths. There is here a religious significance pertaining to the noblest of all metals. Gold is also one of the metals used in the preparation of badges,[7] sceptres, &c. The king should mark those who have been his employees by the proper insignia of office placed on steel, copper, bell-metal or bronze, silver, gold and jewels. Again, two men bearing gold sceptres[8] are to be on one side to communicate the presence and salutation of persons to the king.

Then there is the reference to its use in sculpture. Thus just as there are special stones[9] appropriate to each Yuga to be used as materials for the images of gods, so we have the rule that Images are to be of gold, silver, copper, and bell-metal or bronze in the satya, tretâ, dwâpara, and kali ages respectively. The order of metals as given here is certainly according to its depreciation in value and people's estimation.

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[1] **Sukra II, 303-304.**

[2] **Sukra II, 692-3.**

[3] **Sukra IV, ii, 205.** Niṣka has a technical meaning. It is the value of gold weighing 4 *mâṣâs*, or 32 *ratis*.

[4] **Sukra II, 712-73.** Cf. Jayaswal in the *Modern Review* for November, 1913.

[5] **Sukra IV, vii, 749-750.**

[6] **Sukra IV, v, 72-73, 79.**

[7] **Sukra II, 853-855.**

[8] **Sukra I, 722.**

[9] **Sukra IV, iv, 310-311, 314.**

The State in relation to Gold.

Certain socio-economic and socio-political laws or regulations with regard to gold are to be noticed. First, without the permission of the king the following things are not to be done by subjects, *e.g.* gambling, use of arms, sales and purchases of gold,[1] silver, jewels, poisons &c. Trade in precious metals and stones cannot thus be carried on without a license. Here is another instance of Sukrâchâryya's advocacy of State Intervention in Industry. Secondly, as we noticed before, those who prepare ornaments of gold,[2] jewels, &c., are mentioned among the artists and artisans who should be maintained by the state. Thirdly, the rate of royalty upon gold[3] mining is declared to be one-half of the produce after the expenses have been met.

Fourthly, those who use others' dress, ornaments and gold are guilty of offences called *chhalas*[4] against the moral sense or social etiquette of the community.

Fifthly, those who deal in gold,[5] grains, and liquids collectively will have earnings according to the amount of their share greater, equal or less. Here is a reference to the joint-stock system or collective organisation in connexion with commercial enterprises, and the rule applies to the dividend of shareholders. The same rule applies not only to commerce and trade as given here, but also to joint-stock industries and handicrafts. Thus "the goldsmiths should get remuneration according to the labour undergone by each in cases where they combine[6] to perform a work of art."

Lastly, we have an idea of the rate of remuneration at which the artists are to be paid who work in gold, *e.g.*, for the manufacture of ornaments, seals, emblems, badges, images, sceptres[7] coins, &c. Thus we are told that the goldsmith's[8] wages is to be one-thirtieth the value worked upon if workmanship be excellent, one-sixtieth if mediocre, and half of that if of inferior order. Wages is to be half of that in the case of *kataka* (bracelet), and in the case of mere melting, half of that. And we have noticed previously the tests by which people are to be protected from metal-workers' fraud.[9] There is at least one reference to the character of goldsmiths. Thus it is said that "goldsmiths[10] are the fathers of thieves." Of course, *all* metal-workers are meant.

Exchange-Value.

Last but not least in importance are the references in *Sukranîti* to the comparative values and "prices" of the metals, *i.e*, their values in terms of

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[1] Sukra I, 603-608.

[2] Sukra II, 397-398.

[3] Sukra IV, ii, 233-235.

[4] Sukra IV, v, 151-152.

[5] Sukra IV, v, 614-615.

[6] Sukra IV, v, 603-604.

[7] Sukra I, 722.

[8] Sukra IV, v, 653-655.

[9] See the reference to the amounts of material that are lost or increased in workmanship. IV, v, 645-652.

[10] Sukra IV, iv, 88.

"money," and their "exchange-value" not only with regard to themselves, but also with regard to other commodities. The distinction between wealth (*Dhana*) and money (*Dravya*) is certainly known to the statesmen of the Sukra cycle. We have noticed above the recognition of the distinction between bullion and coin in *Sukraniti*. The 'unit' of currency and monetary measurement as well as prices and other allied subjects will be discussed in the chapters on the *Data of Ancient Indian Economics* and *Public Finance.*

It may be noticed here that both gold and silver seem to be mediums of exchange and "legal tender" in *Sukraniti.* Prices are mentioned sometimes in terms of gold, often in terms of silver. "Eight *ratis* make one *mâṣâ,* ten *mâṣâs* make one *suvarṇa.*[1] Five times that *suvarṇa* make eighty silver *karṣakas.*" The Suvarṇa and Karṣaka are gold and silver *coins* respectively, and one Suvarṇa is equivalent to sixteen Karṣakas. The same ratio[2] is also noted by Sukra in determining the comparative value of gold and silver as bullion or ingot. Thus "the value of gold[3] is sixteen times that of silver."

The face-value and metallic value of the gold coin were the same in the mediæval Chola Empire (800—1200 A.D.) The statement in *Sukraniti* can be well illustrated by the following extract from Aiyangar's *Ancient India*: "The unit of currency was the gold *Kâsu* (28 grains Troy). This coin appears to have passed for its metallic value, because the great Râjarâja got all gifts to the temple carefully weighed and appraised. All gold ornaments among these are entered with their weights alone, but no value is given, while jewels set with brilliants, etc., are entered with their weights and their value in *Kâsu.* We can safely infer that the *Kâsu* passed for its weight in gold, although its value in grain and cattle might vary."

In 1883, *i.e.*, about thirty years ago, Dr. Râmadâsa Sen noticed the ratio of gold to silver to be 1 to 20. To-day it is about 1 to 24. There has thus been a great decline in the value of silver *as money, i.e.*, a falling off in the purchasing power of silver coins since the days of Sukrâchâryya. It would be an interesting study in Indian Economic and Financial History to find out the epoch or epochs when the ratio given by Sukrâchâryya held good. That would go a great way in fixing the age of the portions of *Sukraniti* referring to the currency.[4]

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[1] Sukra IV, ii, 138-139.

[2] It would thus be evident that both nominal or "face" value and intrinsic or "real" value of the coins are the same. There is no law artificially regulating the price of the coins and the precious metals. The market value of the metals (as indicated by the relation between gold and silver as bullion) was maintained in the currency.

[3] Sukra IV, ii, 181.

[4] This will be dealt with in a subsequent chapter. Statistics given in Brihat Saṃhitâ (6th cent.), Yuktikalpataru (11th cent.), and Ayeen Akbari (16th cent.), would supply valuable materials for a history of Indian Prices. The Bengali work of the 17th century, the *Kavi-Kankaṇa-Chandi,* and *Seir Mutaquherin* of the 18th century are also important documents of socio-economic history.

According to Dhâtukriyâ, a Tantric work of the 16th century, Mahâdeva enumerates to Pârvati the following places as sources of gold and auriferous ores: *Pâvakadri* (?), seaside countries, Sindhu, Kâmarûpa, &c.

ii. *Silver.*

Like the sun and the moon, gold and silver have been mentioned in *Sukraniti* almost as twins. References to the two metals have been made together both explicitly as well as implicitly. Thus our information about silver is nearly the same as about gold, whether as regards (1) examination as to genuineness, or identification, (2) the uses as money *i.e.* standard of value and medium of exchange, (3) the socio-economic and socio-political regulations, (4) the uses in decorative or useful arts, (5) the rates of royalty upon mining and (6) wages to artists, or as regards (7) the circulation as 'legal tender.' The Sukra statesmen have supplied us with parallel facts on all these points in connexion with the two noblest of metals. The following account deals with the remarks about silver.

The examination[1] of silver need not detain us for it is the same as that of gold and other metals.

The wastage or increment of silver inevitable in the industrial processes are known by the following rules: (1) "Silver is diminished by four-hundredth part[2] when melted; if it is otherwise, the artisan should always be punished by the king. (2) In articles of best workmanship silver is lost by a hundredth part; and if soldered by a good material the weight is increased by a sixteenth part.

Silver[3] is mentioned along with gold (1) as a valuable commodity or as coins to be studied by the king for four *muhurtas* before meals, (2) in connexion with the appointment of officers[4] in charge of jewels and coins, (3) in connexion with expenditure on houses that are meant for valuables,'[5] (4) in the definition of *dravya*[6] or 'Money,' and (5) as booty[7] to be distributed among the soldiers by the king.

Besides the uses of silver as ornaments, valuables and coins, we find references in *Sukraniti* to the metal being used (1) in the preparation of badges[8] by which officers are to be distinguished, and (2) in the construction of images in *Tretâyuga.*[9]

The socio-economic laws regarding silver are also the same as those for gold. Thus (1) trade in silver[10] cannot be carried on without a license. (2) The rate of royalty upon silver[11] mining is declared to be one-half of the produce after the expenses of extraction have been met. (3) The references to (*a*) *chhalas* and (*b*) joint-stock organisation are implied,[12] though silver has not been definitely mentioned. (4) The rate of remuneration for the artist is given below : The silversmith's wages[1] is to be half of the material worked upon, if workmanship be of the highest order, half of this if mediocre, half of that if inferior, and half of that in the case of *kataka* (bracelet). In the case of the craft conducted on joint stock principles, the silversmiths are to be governed by the same rule as goldsmiths.[2]

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[1] Sukra IV, ii, 178-179.

[2] Sukra IV, v, 646-47, 649-652.

[3] Sukra I, 561-562.

[4] Sukra II, 303-304, 237-238.

[5] Sukra II, 692-693.

[6] Sukra II, 712-713.

[7] Sukra IV, vii, 749-750.

[8] Sukra II, 853-55.

[9] Sukra IV, iv, 314.

[10] Sukra I, 603-608.

[11] Sukra IV, ii, 233-235.

[12] Sukra IV, v, 151-152, 614-615.

The silver coin is called *karṣaka*,[3] sixteen *karṣakas* make one *suvarṇa* or gold coin. The ratio of silver to gold *as money* is exactly the same as that *as bullion*. Thus "the value of gold is sixteen times that of silver.[4]" The comparative value of silver and copper is also given. "The value of silver is almost eighty times that of copper." The financial and economic questions[5] connected with the metals will be dealt with in a separate chapter.

It now remains to note one remark about silver which the Sukra authors have not made regarding gold or other metals. "The king should daily receive from the sales of silver[6] one-fifth, one-fourth, one-third or one-half—not more" It is difficult to see the propriety of this, since the royalty on mining has been once described and since the duty on sales has not been mentioned as regards other metals.

The following extract relates to the antiquity and history of silver-extraction in India :—

"Solomon is said to have hired fleets of ships from Tarshish for the purpose of obtaining from Ophir the silver used in decorating his palace and temple. The latter place has been identified by some writers as a port or district on the Malabar coast; but at least it is undoubted that Pliny, who wrote A.D. 77, referred to India as a country whence silver was obtained for the use of the Romans.[7] * * * There seems good reason to believe that the Chinese obtained silver from Malabar. * * * In the *Ayeen Akbari*, written about the end of the sixteenth century, silver mines are mentioned near Agra and in Kashmir. * * * Tavernier in his *Travels* says in one passage that Japan is the only Asiatic country where silver occurs, but afterwards cites Bhutan and Assam as possessing silver mines."

iii Copper.

The examination of copper has to be conducted according to the same method as that of gold and silver. The wastage[8] of copper in industries amounts to one-hundredth part.

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[1] Sukra IV, v, 656-657.

[2] Sukra IV, v, 603-604.

[3] Sukra IV, ii, 139.

[4] Sukra IV, ii, 181, 182.

[5] For Indian Numismatics, see the *Historical Volume*, and for Modern Indian Currency and Prices, see the *Economic Volume* of the *Indian Empire* in the *Imperial Gazetteer Series*.

[6] Sukra IV, v, 643-644.

[7] *Dictionary of the Economic Products of India*, Vol. VI, Part III, pp. 238-243.

[8] Sukra IV, v, 647.

Copper is not mentioned as a valuable to be hoarded nor as a material for ornaments. Badges,[1] however, are made of this material. Images[2] of gods also are constructed out of copper in *Dwâparayuga.*[3] The rate of royalty upon copper mining[4] is one-fourth of the produce. The coppersmith[5] is to get one-fourth of the value worked upon as wages.

Copper coins are mentioned in the definition of Dravya or 'Money' along with gold and silver (II, 712-713). A *paṇa*[6] is a piece of copper coined by the king weighing ten *mâṣâs*. The following comparative values[7] define the position of copper in the scale of prices: "The value of silver is eighty times that of copper. The value of tin is one and a half times that of copper, that of zinc twice that of tin, *i.e.*, thrice that of copper, that of lead thrice that of tin, *i.e.* four times and a half of that of copper, that of iron six times." Excluding cowries, copper coin is thus of the lowest value in the realm, gold being the highest and silver intermediate. The currency questions will be discussed in a subsequent chapter along with the historical significance of the prices.

It remains now to note that among artisans to be 'protected' by the king we find the mention of coppersmith;[8] and that copper is a constituent[9] of two alloys: (1) bell-metal or bronze, together with tin, and (2) brass, together with zinc.

In the *Dhâtukriyâ* of the sixteenth century, the following places have been enumerated as the sources of copper: Nepal, Kâmarûpa, Bangala, *Madaneswar*(?), *Gangâdwâra*(?), *Malâdri*(?), the country of the Mlechchhas, *Pâvakâdri*(?), Rûma (Constantinople), the country of the Phirangas (Portuguese and Europeans).

Mr. Medlicott, F. R. S., gives the following distribution of copper in the *Dictionary of Economic Products of India*: Singhbhum, Dhalbhum, Hazaribagh, Rajputanâ States, Ajmir, Afghanistan, Kumaon, Gharwal, Darjiling, Western Duars, Kurnul and Nellore.

"In ancient times copper mines were worked on a larger scale than at present."

The importance of copper in Hindu religious ceremonies is thus described in the *Journal of Indian Art*:[10] "Fine shrines for the god, with excellent flower-carvings; dishes or platters with tanks or lotus patterns nicely worked out; the pedestal for the placing of the image during the sacred bath; the vessels except when the worshipper is rich and can afford silver ones, and everything connected with the performance of Hindu worship are made of copper."

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[1] Sukra II, 853-855.

[2] For copper in Indian Art, see Vincent Smith's *History of Fine Art in India and Ceylon*, pp. 171-172, 198, 364. *Vide* also Birdwood's *Paris Universal Exhibition*, 1878, pp. 61-2 (2nd Edition).

[3] Sukra IV, iv, 314.

[4] Sukra IV, ii, 233-235.

[5] Sukra IV, v, 658-659.

[6] Sukra IV, i, 233.

[7] Sukra IV, ii, 182-184.

[8] Sukra II, 399.

[9] Sukra IV, ii, 176.

[10] P. 29, Vol III, No. 29.

iv. Iron.

Iron is an important substance, though it is not used as material for coins. The list of 64 *kalâs*[1] or practical arts, as well as the enumeration of the artisans[2] and artists to be maintained by the state, indicate the place that iron occupies in Industrial life. We may note that iron-images[3] are also recommended.

The wastage[4] of material involved in workmanship amounts to one-eighth part. The wages[5] of the blacksmith may be half of, or equal to, or twice or eight times of, the value worked upon. The rate of royalty[6] is one-sixth of iron upon the produce after the expenses have been met.

Among the industries[7] in which iron plays a conspicuous part are those connected with warfare. The arms and weapons, chariots and ordnances all require the use of iron. The Sukra authors have noticed it. Needles and razors have also been mentioned. We are also told that even the hard iron can, by proper methods, be converted into a liquid.[8]

The value of iron[9] is six times that of copper.

In his *Handbook to the Indian Court*[10] at the Paris Universal Exhibition of 1878, Sir George Birdwood remarks: "Iron is frequently mentioned in the Bible under the Hebrew name of *paldah*, which is the Arabic *fulad*, and indicates Indian iron." And Mr. E. B. Havell[11] is of opinion that in the use of steel "Hindu craftsmen had no rival until quite modern times," and refers to the notes on the use of wrought-iron girders in Orissan temples in *Orissa and her Remains* by Mr. Manomohan Ganguly, B. E.

The following gives the geographical distribution of iron ores according to Dhâtukriyâ (16th century): Lohâdri, Gayâdri, Gautamâdri, Vindhya, Nalâdri, Tryamvaka, seaside places.

v. Tin.

Information about this metal is very small in *Sukraniti.* We are told that the wastage of the material in industrial processes amounts to one-sixteenth part.[12] The rate of royalty upon tin-mining[13] is one-sixth of the produce after the expenses have been met. The workman's remuneration[14] is one-fourth of the value worked upon. We are not told what are the industries in which tin plays a part, except that together with copper it makes the alloy bell-metal[1] or bronze. The proportion of the constituents is not stated. The value of tin[2] is one and a half times that of copper.

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[1] Sukra IV, iii, 132-200.

[2] Sukra II, 393-411.

[3] Sukra IV, iv, 317.

[4] Sukra IV, v, 646-648.

[5] Sukra IV, v, 658-659.

[6] Sukra IV, ii, 233-35.

[7] See references to chariots (IV, vii, 60-63), nâlikâstras (IV, vii, 389-394), cannon-balls and bullets (IV, vii, 407-408), gunpowders (IV, vii, 411-15), and the weapons (IV, vii, 422-34).

[8] Sukra IV, vii, 588-90.

[9] Sukra IV, ii, 183-184.

[10] Second Edition p. 28.

[11] Indian Architecture, p. 122.

[12] Sukra IV, v, 646-648.

[13] Sukra IV, ii, 233-235.

[14] Sukra IV, v, 658-659.

India is not naturally rich in tin-ores, the deposits "being more of mineralogical than practiceal interest ; as modern geological surveys indicate. In certain parts of the Malaya Peninsula and Burma, however, rich deposits of tin-stone occur." Oldham and Ball have described these occurrences in Further India.

Says Dr. Watt[3] "tin has been known in India from a very remote period, and early held an important place in Sanskrit Materia Medica, being mentioned by Susruta. The supply was probably obtained from Burma or from some of the tin-producing islands of the Malaya Archipelago ; between which and India trade must have existed in very ancient times."

But, as we have seen, tin was familiar to the Hindus even in Vedic times. The connexion (commercial, and also political) between India and Further India must therefore be inferred to have existed so early as that. And according to Birdwood,[4] "Homer mentions tin by its Sanskrit name *Kastira* ; and the Phœnicians, who first learnt the name from the trade through the Arabs with India, afterwards gave the name of Cassiterides to the Scilly islands and Cornwall where it still survives in Cassiter street, Bodmin."

vi. Lead.

Information about lead in *Sukranīti* is as meagre as that about tin, though it is slightly greater. Thus we are told that lead-images[5] may be constructed for religious purposes ; and that lead may be used for cannon-balls[6] and also as an ingredient of gunpower.[7]

The wastage[8] of material in industrial processes amounts to one-sixteenth part, the artisan's remuneration is not mentioned. The rate of royalty upon lead-mining is one-sixth of the produce after the expenses of extraction have been met. The value of lead is thrice that of tin *i.e.*, four times and a half of that of copper.

The geographical distribution of lead is thus given in Dhâtukriyâ of the 16th cent. : Nepâla, Kedâra, Karmakânda, Tryamvaka, Tripura.

" Although at the present time lead ores are not largely worked in India, Ball[9] states that there is probably no metal of which the ores have been worked to so large an extent in ancient times, excepting those of iron. This is testified to by the number of old mines in Southern India, Râjputana, Baluchistan, and Afghanistan."

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[1] Sukra IV, ii, 176.

[2] Sukra IV ii, 183.

[3] See *Dictionary of the Economic Products of India*, Vol. VI, Part IV, pp. 57-62. On the authority of Dr. U. C. Dutt, Dr. Watt traces the antiquity of tin to Susruta. But for recent researches, see Macdonell and Keith's *Vedic Index*, I, 31, 326.

[4] *Paris Universl Exhibition* (2nd Edition), p. 28. Mr. Schoff, however, believes *Kastira* to be a non-Sanskrit word, cf. *Periplus*, p. 79.

[5] Sukra IV, iv, 317.

[6] Sukra IV, vii, 407-408.

[7] Sukra IV, vii, 411-415.

[8] Sukra IV, v, 646-48.

[9] *Dictionary of Economic Products of India* (1890), Vol. IV, pp. 602-3.

According to Mr. Schoff's *Periplus*,[1] "Lead and Tin are mentioned in the *Artha Śâstra* as alloys used in coining."

vii. Zinc.

We have already noticed several important points in connexion with the use of zinc in India under the heading of the *Doctrine of Seven Metals.*

The wastage[2] of material in industrial processes amounts to one-sixteenth part. The remuneration[3] of the workman is one-fourth of the value worked upon. The rate of royalty upon mining is not given. Its value is twice that of tin, *i.e.*, thrice that of copper.[4] It enters into the composition of the alloy brass,[5] together with copper; but the proportion of the constituents is not given.

Dhâtukriyâ, a Tantric work of the 16th century, enumerates the following sources of zinc: *Kumbhâdri*, Kâmboja, Rûma, Balkh, Bangala.

"Zinc, according to Mr. Dampier,[6] "appears to have been introduced into Europe from India, whence, as in the similar case of muslin and calico, it has returned in such volume as to oust the original native product.

"Zinc[7] occurs in nature, in combination with sulphur, forming the sulphide or zinc *blende*, with oxygen forming *zincite*; and more rarely as a silicate, carbonate, sulphate or arsenate. * * * "The only considerable deposit of zinc ores, which has been extensively worked in the peninsula, occurs in this region (Râjputana) at Jawar in the Udepur State. * * * In Colonel Tod's *Râjasthan*, the mines are alluded to incidentally as having yielded an annual revenue of Rs. 2,22,000. * * * The mines were closed during the famine of 1812-1813 and have not since been re-opened. The ore appears to consist chiefly of zinc carbonate."

Mr. John Henry Pepper in *The Play-Book of Metals* gives the following history of zinc in the west: "The metal was not known to the ancients, although they were acquainted with the mineral cadmium or calamine; and without it they could not have made brass. Hesiod states that 'in remote ages the earth was filled with brass implements of agriculture, because iron had not been discovered.' The use of calamine in the composition of brass was known to Aristotle, who makes a distinction between the compound resulting from the mixture of copper and calamine and that resulting from the mixture of copper and tin.[1] * * * Zinc appears to have been first called by that name in the writings of the madly-Zealous Paracelsus, about the year 1540."

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[1] P. 221 (Longmans, 1912).

[2] Sukra IV, v, 646 648.

[3] Sukra IV, v, 658-659.

[4] Sukra IV, ii, 183-184.

[5] Sukra IV, ii, 176.

[6] *Monograph on Brass and Copper wares* (1894), p. 21.

[7] *Dictionary of the Economic Products of India*, Vol. VI, Part IV (1893), pp. 356-357.

We have seen previously that zinc has been mentioned by the Hindus as a separate metal by King Madanapâla of Kanauj in 1374.

(*b*) *The alloys.*

Two alloys[2] are mentioned in *Sukraniti*: (1) kâmsya which may be either bronze or bell-metal, and (2) pittala or brass.

Kâmsya is the alloy of tin and copper, in what proportions, it is not stated. It is mentioned (1) as one of the materials that may be used in the manufacture of badges[3] by which the officers of the state are to be distinguished from one another; and (2) as the material to be used in the construction of images[4] for the *Kaliyuga.*

We are not supplied with any information as to the duties on commercial transactions, the rate of remuneration of the workmen, &c., as we are not told anything about the other alloy.

"Brass and bronze play in the Hindu household as important parts as glass and china wares among the western nations.[5] * * The Hindus influenced strongly by a * * feeling against using earthen and wooden wares, have been using from time immemorial, brass and bronze wares for domestic purposes, and copper ones on ceremonial occasions."

The treatment of brasses and bronzes in mediæval Hindu art has been described by Mr. Vincent Smith[6] in connexion with South Indian workmanship. He has given illustrations of brass portrait images of Krisṇarâya of Vijayagara (A.D. 1510-29) and his queens, Natarâja or dancing Siva from Tanjore, the Bronze Pârvati (12th cent), bearded Râmchandra in bronze (18th cent. ?) and plunging horse in bronze cast. Mr. Smith also refers to the many-sided genius of Vitapâla, the East Indian worker in bronze and stone, of Pâla times.

SECTION 9.

General remarks on Gems in Sukraniti.

Pearls have been fished along the Coromandel Coast from long before the time of Alexander's invasion. Pearls, precious stones and gold have been known in India as elements of ornament from time immemorial. Manu ordains a fine for piercing fine gems as diamonds or rubies and for boring pearls or inferior gems improperly. Râjendralâl quotes *Mrichchhakaṭi* or "Troy-Cart" of the 1st cent. B. C. to show that the author Sudraka did not think it inconsistent to describe, in the courtyard of a common courtezan's house, jeweller's shops, "where skilful artists[1] were examining pearls, topazes, sapphires, emeralds, rubies, lapis lazuli, coral and other jewels; some set rubies in gold, some work gold ornaments on coloured thread, some string pearls, some grind the lapis lazuli, some pierce shells, and some cut coral." Nor were the people satisfied with such originals; the requriments of society rendered the fabrication of false jewellery a commonly practised art, in fact, one of the 64 *Kalâs* according to Sukrâchâryya.

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[1] Edition of 1861, pp. 494-95. See also *Encyclopædia Britannica* (11th Edition), Vol. 28, p. 981.

[2] Sukra IV, ii, 176. *Vide* Birdwood's *Paris Universal Exhibition*, 1878, pp. 61-63.

[3] Sukra II, 853-855.

[4] Sukra IV, iv, 314.

[5] The *Decline of South Indian Arts* by Pandita Natesa Sastu in the *Journal of Indian Art*, Vol. III, January 1890.

[6] For bronze as a material in Indian Art, see Vincent Smith's *History of Fine Art in India and Ceylon*, pp. 179-180, 286, 266-7, 305-7.

The authors of Sukra cycle have mentioned jewels and precious stones mainly as valuable articles of commerce. As such, references to these in Sukranîti are parallel to the remarks about gold and silver, the two noble metals. Sometimes of course the word *ratna* or gem is used metaphorically when it includes the noble metals as well. There is at least one remark of Sukra which takes the term metaphorically and gives reasons also. "Those which are rare in this world are priced as gems."

As valuable commodities, the gems are hoarded in the treasury and demand the king's attention of four muhurtas[2] before meals. They require a special officer[3] to look after them with the qualifications of a mineralogist, who can detect the false stones and select the genuine ones. Special houses that are to be built for them are erected at a cost which is technically known as *bhogya*.[4]

The definition of *dravya*[5] or 'Money' includes not only the metallic coins but also gems and cowries. The custom of distributing booty[6] among the soldiery applies to gems also, though they are not distinctly mentioned. Jewels like metals may be used to serve the purposes of badges[7] meant for distinguishing between officer and officer. Trade in jewels[8] is forbidden without a charter or license. Like the goldsmiths, coppersmiths and other metalworkers, artists[9] and artisans in gems and jewels also deserve encouragement and "protection" of the state.

The use of jewels belonging to some other person is one of the *chhalas*[10] or social offences recognised by the state. This is to be guessed from the description of the offence with regard to gold and ornaments. Similarly also, the rule about dividends of joint enterprises[11] and collective dealings in precious stones, is to be inferred from that with regard to gold, grains and liquids.

We have been told that jewellers should be patronised by the state, but information as to the rate of remuneration is not available. The rate of royalty, however, is mentioned It is declared to be half of the *net* yield of precious metals, *i.e.*, after the expenses of extraction and production have been met. The realisation of Government revenue from *ratnas*[1] is important enough to be recognised as an item that should be studied by the *Sumantra* or Finance Minister. Besides the revenue accruing regularly from the *âkaras* or mines, Sukrâcharâyya's system of Public Finance recognises *Ajnâtaswâmika*[2] income. It is that wealth whose owners are unknown. Gems and jewels (*Nidhi*) picked up in streets escheat to the state and constitute this class of income.

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[1] Wilson's *Hindu Theatre*, II, 85.

[2] Sukra I, 561-562.

[3] Sukra II, 303-304, 237-238.

[4] Sukra II, 692-693.

[5] Sukra II, 712-713.

[6] Sukra IV, vii, 749-750.

[7] Sukra II, 853-855.

[8] Sukra I, 603-608.

[9] Sukra II, 397-398.

[10] Sukra IV, v, 151-152.

[11] Sukra IV, v, 614-615.

Among property laws it is mentioned that the father is the lord of all gems[3] etc., but neither the father nor the grand-father has authority over all immovables. This is a regulation about *all* precious movables.

We have thus far noted the parallelism between gems and noble metals as valuable commodities. The fraud that may be committed with regard to them, *e.g.*, by the passing off of imitation jewels as genuine ones has also to be noticed. It is mainly to guard the treasurer, the minister of Public Finance and the king as well as the people that the Sukra statesmen have introduced the topics of Economic Mineralogy in their *Nitisâstra*. If it is the ornament of jewels to have splendour,[4] and if it be a general custom to present jewels and ornaments[5] to females at marriage, it is necessary that people should have the eye to find out what is the proper splendour of a jewel. Besides, there are natural defects[6] in gems. It is known also that people of the island of Ceylon can make artificial[7] pearls. The making of artificial gems[8] is in fact known to be a *kalâ*. Like the testing of gold and other metals, therefore, testing of gems as to whether they are good or bad, as possessing marks or holes, has been recognised as a *kalâ*. The advice to rich people and kings necessarily is: "The wise man should determine their value by carefully examining[9] them." "The king should keep the jewels after having them tested by experts as well as by himself."

The following general rule may help people in testing the worth of precious stones: "Those who are experts in the study of gems describe that gem as the best which has no pores,[10] has good colour, is without scratches and spots, has good angles and bright lustre."

The general information about colour and shape is being made more clear in the following lines: [11] (1) "Gems (*a*) may have the colour of *sarkara* (powdered bricks) or leaves of trees, and (*b*) may be flat or round in shape; (2) "The colour and lustre of gems may be white, red, yellow and black."

There are two technical terms[12] here used in connexion with the splendour of precious stones, *viz.*, *Chhâyâ* and *Prabhâ*. The terms have been defined by Sukra thus: (1) "The *Chhâyâ* is that which attacks,[1] overpowers, and eclipses the colour (of other substances)." (2) The *Prabhâ*[2] is that which reveals the colour (of other substances). Prof. Ray in *Ratnaparikṣâ* explains the remarks of Sukra in the following way: The light of a lamp does two things simultaneously: (1) It removes the darkness and makes other objects visible, *i.e.*, makes it possible for them to display their colour and attributes. (2) It prevents like objects, *e.g.*, white paper or milk, from displaying their proper colour and attributes. The first function of the lamp is due to its lustre or *prabhâ*, the second is due to its *chhâyâ*. The light issuing from a lamp or a jewel may thus be divided into two branches—(1) *reflected*, which makes other things visible, (2) *transmitted* which eclipses other objects.

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[1] Sukra II, 211-212.

[2] Sukra II, 656-657.

[3] Sukra IV, v, 577-578.

[4] Sukra II, 463-479.

[5] Sukra IV, ii, 171.

[6] Sukra IV, ii, 124.

[7] Sukra IV, iii, 178.

[8] Sukra IV, iv, 21-22.

[9] Sukra IV, ii, 171-172, 79-80.

[10] Sukra IV, ii, 97-98.

[11] Sukra IV, ii, 99-100.

[12] Sukra IV, ii 103.

As for the value of precious stones, Sukra statesmen know that it depends on both Demand and Supply. Omitting from one's consideration the factors that go to make "Demand-Schedule," as it is called by Professor Marshall, we may note the following conditions on the Supply side. These conditions[3] give in fact additional tests by which the splendour, lustre, and beauty of jewels are to be determined, and the considerations which weigh much in people's estimation:—

(1) Other things remaining the same, the "exchange-value" of a gem depends on its weight, lustre, colour, extent, receptacle and shape.

(2) Other things remaining the same, the 'exchange-value' increases if there be great bulk with small weight, and decreases if there be small bulk with great weight.

(3) Other things remaining the same, 'exchange value' is smallest if the lustre be that of *sarkara* (reddish powder of bricks); is middling if the shape be flat; and greatest if the lustre be that of green leaves.

(4) Other things remaining the same, round jewels are not much appreciated and their 'exchange-value' depends on the "Demand-Schedule."

The following information about gems recorded by the authors of the Sukra cycle is useful:

(1) The gem on the head of the snake[4] is the best of all, of great splendour, but very rare. The tradition is old enough. The real explanation of gems lying in the heads of snakes is that these creatures carry bright stones in their mouths when they have to move in the dark. These they pick up from stocks and stones in hills and mines and forests. When they get their prey, they throw these jewels away from their mouths for a time, and carry them again as lamps to point out their way, when they have finished their work at the spot.

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[1] This is the explanation of Prof. Yoges Ch. Ray. The reader is requested to note the difference from my translation of the hemistich on p. 141 of the Sacred Books of the Hindus Series XIII.

[2] P. 24, Edition of 1904.

[3] Sukra IV, ii, 107-114.

[4] Sukra IV, ii, 96.

(2) Except pearls and corals the gems cannot be cut or written upon[1] by iron and stones (diamonds). This is said by those who are experts in gems.

(3) The value of gems is measured by weight.[2]

(4) One should receive knowledge, *mantra*, medicine, wife and gems[3] even from low families. This general rule of morality may be compared to Chāṇakya's[4] adage that one should take gold from even the impure (persons or places), the jewel of a wife from even low families, and good (useful) knowledge from even the lowborn. It is implied that medicines, gems, &c., were in Sukra's days, as in ancient Hindu times generally, dealt in by the low class men. Here is the sanction that these things may be accepted from persons, who, otherwise beyond the pale of high society, are, however, experts in their subjects.

(5) The gem that has its appropriate colour and lustre and is devoid of any defects is beneficial to beauty,[5] growth, fame, valour and life. Others are known to be injurious. This notion about the efficacy of precious stones obtains with regard to noble metals also, and has had its sway since time immemorial, both in the Eastern and Western worlds. The story of the Talisman is well-known, and we have already quoted extracts from Vedic literature bearing on this point.

(6) The above general idea has been crystallised by Sukra sociologists into a definite maxim of sound health. Thus we are told (*a*) that one should always use medicinal substances in jewels[6] consecrated by charms or mantras. (*b*) One should never wear gems that have black or red spots.[7]

(7) Gems found in the Gandaka[8] river are natural images, and need not be given to the sculptor to try his skill upon. And we are told that, whereas in the case of images constructed by artists one should thoroughly examine their parts and proportions according to the canons of *Silpasâstras*, these and other natural stones should not be examined at all.

(8) Gems never lose their natural attributes. These cannot deteriorate. But pearls and corals can. It is only the wickedness of kings[9] that leads to fluctuation in their exchange-values.

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[1] Sukra IV, ii, 109-110.

[2] Sukra IV, ii, 129, *Gomeda* is the exception. It is not to be weighed, being very insignificant. The standard of measurements of precious stones is given in Sukra IV, ii, 130-133.

[3] Sukra III, 193-194.

[4] Amedhyâdapi Kânchanam,
Nîchadapyuttamâ vidyâ Stri-ratnam duskulâdapi.

[5] Sukra IV, ii, 101-103.

[6] Sukra III, 8-9.

[7] Sukra IV, iv, 307-308. Such other natural images are *Vanalingas*, *Chandrakântas*.

[8] Sukra IV, ii, 115-116.

[9] Sukra IV, ii, 156.

SECTION 10.

The Doctrine of Nine Gems.

Nine is a mystic number like seven. In Indian thought we have the tradition of nine planets, nine gems, nine nights (called *navarâtra*,[1] meaning thereby the sacrificial rite that is finished in nine days or nights), nine *rasas* (or feelings and emotions, *e.g.*, amorous, ludicrous, pathetic, vehement, heroic, terrific, loathsome, absurd, and peaceful, according to Hindu canons of literary art), the nine *lakṣaṇas* (or marks of Brahma) according to Vedânta Paribhâṣâ, the nine *Saktis* (or energies), the nine castes (of the Sudra order, according to Parâśara Samhitâ), the nine doors (*e.g.*, two eyes, mouth, etc., of the human organism), the nine islands of the Ganges (which, according to the Vaiṣṇava poet, Narahari Dâsa, formed the site of what in later times has been Navadvîpa or Nadia, the land of Chaitanya), also the nine tests of Kulinism propounded by king Ballâla Sen of Bengal (12th cent.).

The doctrine of nine gems, like that of the seven metals, has an interesting history. Indian tradition has taken the nine gems both literally and metaphorically. In this latter aspect we have it when we refer to the strong popular notion about the "Navaratna" [2] of the court of Vikramâditya. The legends of Vikramâditya cycle, like those connected with Alexander, Arthur and Charlemagne in European literature, refer to things that are half-historical, half-mythical. The hero himself, round whom the romances have grown, has not yet been indentified. Some of the incidents connected with Vikramâdityan tradition have in these days been ascribed to Samudragupta, the Indian Napoleon, in whose conquest of the four quarters of India, scholars have seen the historic counterpart of the Kalidâsic hero Raghu's *Digvijaya*. We know the age of Samudragupta (4th cent. A.D.), or for the matter of that, of the Vikramâditya of legendary fame, to be one of the most glorious epochs of Hindu culture, one of the Augustan ages of Indian literature. There can be no objection, therefore, to regarding this Gupta monarch as the patron of several groups of nine celebrated intellectual giants, who are figuratively known as the *Navaratna.*[1] But Indian chronology cannot as yet bear out the tradition that the great luminaries included in the term *Navaratna* ever shone in the intellectual firmament of India at one and the same time. To take only two instances. If the Gupta monarchs were the patrons of Kâlidâsa,[2] he must be placed between the 4th and 5th century. But Varâhamihira, the astronomer, is now known to have flourished in the sixth century.

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[1] See the word *Navaratna* in the Bengali *Viśvakoṣa* (Encyclopaedia Indica) edited by Mr. Nagendranath Vasu, Vol. IX, pp. 653-657 (First Edition, 1898). This Volume gives several words beginning with *nava* or nine, which are important as testifying to the tradition. The word *Navanavaka* occurs in Dakṣa Samhitâ (III; 3) as a mnemonic for nine groups or classes of householder's duties, each consisting of nine functions. Thus we have nine *amritas* or sweet functions, nine gifts, nine duties, nine forbidden things, nine secret activities, nine successful functions, nine failures, nine public activities, and nine things (not to be given away).

[2] These are Dhanvantari (the physician), Kṣapaṇaka (the philologist), Amarasimha (the lexicographer), Sanku (the elocutionist), Vetâlabhatta (the necromancer), Ghatakarpara (the Politician), Kâlidâsa (the poet), Varâhamihira (the astronomer), and Vararuchi (the grammarian of Prâkrit languages). The couplet containing the names of the nine luminaries of Vikramâditya's court is found in the last chapter of *Jyotirvidâbharaṇa* by the astrologer, named Kâlidâsa (13th century).

Under these circumstances, the easiest explanation would of course be to ascribe the origin of the tradition to the desire of the people for a convenient mnemonic grouping together the greatest makers of national literature, art, and science through the ages, long after the great masters had played their part on the world's stage. The traditions of the seven wise men of Greece and the seven Magi of Persia afford instances of such convenient groupings of men who have lived, if they were really men of flesh and blood, ages apart from each other.

It is posterity that arranges, classifies, and systematises the exploits of the predecessors. Human memory in reconstructing the history of past generations through the dim vistas of folklores, traditions, myths and fables obliterates[3] the sharp edges of temporal and local differences; and the result is a well-rounded 'system,' a cleverly assorted 'Noah's ark,' a sweet company of 'strange bed-fellows' and a glib enumeration of facts and 'things that never were on sea or land.' Such latter-day recounting and reconstruction of the deeds of the founders of a people's greatness as are improvised for the purpose of helping the national memory and aid in the promotion of race-consciousness are not, however, without deep historical and sociological significance. For these traditions are, at any rate, replete with the associations of the epochs in which they were made and must bear the impress of the general features of the culture of the day.

Thus the metaphorical use of the doctrine of nine gems in Indian traditional thought must be ascribed to an epoch which has long been used to the idea of nine gems literally speaking. The philosophy and history of the metaphorical use must follow the philosophy and history of the tradition regarding the actual stones of the mother-earth.

The enumeration and classification of precious stones, however, have not been uniform in Indian mineralogical literature. The tradition recorded in

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[1] See the discussion in Prof. Wilson's *Viṣṇu Purāṇa* (1864) Vol. I. Preface pages vii—ix.

[2] Pandit Râmavatâra Śarmâ Sâhityâchâryya, M. A., Professor of Patna College, Bankipur, and Dr. Bloch have proved that the author of *Raghuvamsam* and *Kumârasambhavam* flourished during the reign of Chandragupta II and Kumâragupta. For an account of covert references to the Gupta Emperors, see the late Mr. Harinath Dey's English Introduction to the Bengali work on Kâlidâsa by Pandit Râjendranâth Vidyâbhushan (1908).

[3] According to tradition Kṣapaṇaka and Amarasimha were probably Jainas, Kâlidâsa belonged to the agricultural caste and Ghatakarpara was a potter, and so on.

Sukraniti about (1) the nine *mahâratnas* or great jewels (2) their grouping in order of merit into four classes, *e.g.*, (*a*) *Sreṣthatara* or *par excellence*, (*b*) *Sreṣtha* or high class, (*c*) *Madhyama* or middling and (*d*) *Nicha* or inferior, and (3) the astral or mystical connexion of each with one of the nine deities presiding over, or apotheosised out of, the nine planets, is only one phase in the history of Hindu ideas about precious stones and jewels. It may be possible to fix the age of certain passages of the *Nitisâstra* of the philosophers of the Sukra cycle by tracing the history of this doctrine of nine gems.

From the close connexion of the nine gems with the nine planets it may be presumed at the outset that the origin of the tradition is to be traced to the idea of *navagraha* in the history of Hindu Astronomy. In the following account, therefore, we have to take note of two things :

(1) Changes in the ideas about the enumeration, classification, &c., of precious gems : (*a*) as *navaratna*, and (*b*) as *nava mahâratna*.

(2) History of the navagraha or nine planets : (*a*) as members of the celestial system and (*b*) as influencing things mundane, specially as presiding over the gems.

(*a*) *Vedic Literature.*

In our account of the history of Indian literature on gems we have alluded to the reference in the Vedas. But information is mostly indefinite and vague. It is only the pearls that have been distinctly mentioned, and an account of their origin given. And though jewels, like metals, are used with charms and incantations against the malevolent influences in enemies and demons, we do not meet with any trace of the connexion that exists between gems and the deities, whether powers of nature or planets and stars of the sky.

But Vedic literature is important in the history of Indian mineralogy from at least one point. We have seen that in the Vedas the generic word for metals is not *dhâtu*, but *ayas*, or *loha*. So also the gems and jewels, whether meaning thereby pearls or diamonds, are generally referred to not as *ratnas*, but as *maṇis*, though the word *ratna* does occur in the *Rig Veda.*

(*b*) *Ayurvedic Literature.*

This word *maṇi* for gems holds the ground for long. In Ayurvedic literature we find Charaka and Susruta using this term. In the introductory chapter of his work Charaka mentions *maṇis* among the drugs pertaining to the earth. We have noticed above that no gem[2] has been enumerated by name

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[1] Prof. Yoges Chandra Ray in his learned work in Bengali on the Astronomy and Astronomers of the Hindus testifies to the belief of the people in Vedic times in the influences of stars and planets on human life. "The propitiation of the *navagraha* or nine planets has been sanctioned in the Pariśiṣta of Sâma Veda."

At least about 1000 B.C. the fact that the movements of the stars governed the fate of men on earth was understood and explained. (See p. 45—Edition 1913). But no definite connexion of stars with jewels or metals is suggested.

[2] See *Charaka Samhitâ*, Sanskrit Text, p. 7 (Edited by Kavirâjas Sen, Calcutta).

in the *Charaka Samhitâ*. So this work also, like Vedic literature, does not throw much light on the doctrine of nine gems.

The information supplied by Susruta is a little more definite. He also uses the term *maṇi* and not *ratna*, and in the chapter on *Food and Drinks* in the Sutrasthâna section of the *Samhitâ* gives the medicinal properties of six gems[1] only. These are muktâ (pearls), vidruma (coral), vajra (diamond), indra (sapphire), vaiduryya (chrysoberyl) and sphatika (crystal).

The word *ratna* must have been always familiar in literary circles, Vedic and post-Vedic. Long before the days of Kâlidâsa, who uses the word frequently, Varâhamihira, who refers to many previous *Ratnasâstras*, and Amarsimha, the lexicographer, who are generally supposed to have flourished between the 4th and 6th century A.D., the gems and precious stones have been referred to by convertible terms, *maṇi* and *ratna*.

It would thus appear that the word *ratna* as a technical term used in scientific treatises has had a longer history than *dhâtu* which, however, as a name of metals, is old enough. The term *loha* has held the ground for a longer period—even in works like Rasaratna-samuchchaya of the 14th century. But the term *maṇi* has allowed its rival *ratna*[2] to flourish parallel to itself and gradually supersede it ever since the times of Buddha, the Epics and earlier Purâṇas.

(*c*) *Varâhamihira*.

Besides *Susruta*, the only important work that supplies positive information on the enumeration and classification of *ratnas* or *maṇis* during the classical period[3] is that scientific work of the sixth century, the *Brihat Samhitâ* of Varâhamihira. This astronomer like, his predecessors of 1000-1500 years ago, fully believes in the mundane influences of the planets and their movements and begins his work with the following words fathered upon the sage Garga : " That prince meets with ruin who does not support a Jyotiṣaka well-versed in all the divisions and sub-divisions of Samhitâ, and in Horoscopy and Astronomy. * * * If there were no Jyotiṣakas, the muhurtas, the tithis, the nakṣatras * * would go wrong. * * * He who loves prosperity ought not to live in a country devoid of a Jyotiṣaka. The Jyotiṣaka[1] forms as it were the eye of the land."

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[1] *Susruta Samhita* Edited by Kavirâjas Devendra Nath Sen and Upendra Nath Sen (1900) pp. 221-222. Susruta knows of other *maṇis* as the compound ending in *âdi* or " *etc* " implies ; but perhaps does not mention them as they are not much used in medicine. Thus, as Dr. Dutt says in the *Materia Medica of the Hindus* : " of the precious stones, diamond, pearl, and coral only are much used in medicine. The rest are rarely used or not used at all," p. 92, (Edition of 1900).

[2] Messrs. Macdonell and Keith consider the word to denote any precious object in *Rigveda*, not necessarily a jewel, as later. *Vedic Index* II, 199. The older word *maṇi* seems to be more generic, *ratna* is the word for more precious substances. The word *maṇi* may be taken more widely, in which sense it would include *metals* on the one hand, and gems on the other.

[3] There has been very little critical study in the literature of this period, and very few materials of a historical or sociological character are at present available.

Varâha then describes the seven planets and the Râhu, but does not mention the Ketu, the ninth planet. In treating of the influences of the planets Varâha does not notice the connexion that may possibly exist between the *grahas* and the *ratnas.*

When, however, towards the close of his work, he notices the gems enumerating them and describing their characteristics, he does this not because these have any natural relationship with the gems of the firmament, but because, like these celestial orbs, and so many other things in the universe, *viz.*, trees, animals, earthquakes, clouds, &c., they independently govern the destiny of mankind. According to Varâhamihira, whatever directly or indirectly affects human welfare are important items and cannot be neglected in that aspect of Jyotiṣa Sâstra which is being dealt with in *Brihat Samhitâ*. The planets have been discussed because they influence man's destiny. So also the meteorological, agricultural and other phenomena have commanded his attention. The same reasons demand of him space for the jewels and precious stones. Varâha has nothing to do with the propitiation of the planets and does not care to study the gems[2] in their special relations to the planets.

Varâha has mentioned 22 gems, but describes only four in detail :— (1) Diamond, (2) Pearls, (3) Rubies, (4) Emeralds. And he treats of the influences of these as affecting social welfare.

The object of Varâha in introducing the subject of gems[3] in the astronomical work is set forth by him at the outset : " A good gem brings prosperity to the king and a bad one brings misery. It is therefore necessary to examine the properties of gems with the help of persons learned in the science ; for a person's fortune depends upon the gems he possesses. Elephants, horses and women possessed of excellent virtues are also known as gems ; but diamonds and the like gems which are to be treated of in this chapter are stones and the like, possessed of many excellent qualities."

The treatment of gems in *Brihat Samhitâ* is thus quite independent of all astronomical ideas explained by the author in his last two works, *Pancha-siddhântikâ* and *Brihajjâtaka*, as well as in certain portions of this work also. The author mentions the special characteristics of such pieces of diamonds and pearls as are sacred to Indra, Yama, Viṣṇu, Varuṇa and Agni, but refers to no species as the favourites of the sun or moon, etc.

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[1] Varâha goes on : " Even the Mlechchhas and Yavanas who have well-studied the science are respected as Riṣis," pp. 10-11, Translation of Mr. Chidambram Iyer, B. A., Founder of Tiravadi Jotistantra Sabha (Madura, 1884).

[2] See Iyer's Brihat Samhitâ XXXIII—XXXVI (pp. 164-174).

[3] In a sense *Brihat Samhitâ* is a socio-economic treatise dealing with the manner in which the lithosphere, hydrosphere and atmosphere of the globe affect human conditions, rather than an astronomical, geographical or botanical work. It is thus to a certain extent allied to *Arthasâstra*, and closely resembles *Yukti-kalpataru* which is perhaps based upon it.

The great astronomical landmark of the 6th century, therefore, does not throw any light on any one of the several problems connected with the *Doctrine of Nine Gems*. We know only that the term *ratna* is established and that the planets influence human beings.

And this is almost where Vedic literature left us.

(*d*) *The Purâṇas.*

The evidence of Amarakoṣa, the lexicon, is not much useful. Agnipurâṇa (of the 8th century?) mentions many gems, but describes only eight: vajra, marakata, padmarâga or mâṇikya (oriental ruby), uruvinda (corundum), saugandhika (spinel), muktâ, indranîla, and vaidurrya. This list differs from that in Sukra by taking corundum and spinel, but rejecting coral, agate, topaz.

Twelve gems are enumerated in the *Garuḍapurâṇa* (9th cent.?). Nine gems are mentioned as principal in the two works that follow: (1) Agastyamatam (10th century?) and (2) Viṣṇudharmottarapurâṇa (10th cent.?). Each of these treatises enumerates more than nine gems, but the first is important as having for the first time referred to the use of nine gems[1] for the propitiation of the nine planets, and the second as having enumerated the same gems as *mahâratnas* that are mentioned by Sukra. These two works thus supply two important factors contributing to the growth of the doctrine of nine gems, that is to be found in Sukranîti, *viz*., (1) the idea that nine gems are sacred to nine grahas, and (2) the classification or appreciation of the same gems as nine 'great jewels.'

(*e*) *Srîpati, the astronomer.*

The idea of *navagraha* must therefore be traced to some astronomical[2] treatise between *Brihat Samhitâ* and *Agastyamatam*. That work is the *Jyotisa-ratnamâlâ* of Srîpati, who flourished between the ages of the famous astronomers Brahmagupta (7th cent.), and Bhâskarâchâryya (11th and 12th cent.). In this treatise there is the mention of nine gems to be used in propitiating the nine planets. But Sripati's other work, *Jâtakapaddhati*, which also deals with the influences of planets on human beings mentions only seven planets.[3] In Sripati, therefore, we find both the old and the new ideas about the number and influences of planets. This self-contradiction and inconsistency are to be explained by the fact that in his time the prevalent notion about nine planets and the utility of worshipping them especially by putting on gems was too powerful to be resisted. He had to incorporate in his second work what he had rejected as unscientific in his first.

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[1] It gives the tests of only five gems. See the Text edited by Dr. Râmdâsa Sen. The order of consecration of gems to planets followed in this work is the same as in Sukranîti, though the interpretation of the mahâratna varies.

[2] See the Bengali work, *Astronomy and Astronomers of the Hindus*, by Prof. Yoges Chandra Ray, pp. 78-10 (Edition, 1903).

[3] See *Sripatipaddhati*, slokas 9, chapter III (Edition of Nirṇaya Sâgara Press, Bombay, 1903), p. 8.

"Mars, the Moon and Saturn have strength by night. Jupiter, the Sun, and Venus have potency by day. Mercury is strong at all times."

Sripati's date[1] has not been fixed beyond doubt. He may be taken to have flourished about the 10th century, in fact, to have been almost a contemporary of the authors of Agastyamatam and Visṇudharmottarapurâṇa. These two works as well as Jyotiṣaratnamâlâ were produced in an atmosphere of the same ideas regarding gems, planets and the allied topics.

Sripati's work is important from another standpoint also. The *Jyotṣiaratnamâlâ* supplies the full astronomical text of the *Doctrine of Navaratna* that has been utilised in *toto* for the mineralogical section of the *Nitisâstra* of Sukrâchâryya. The same nine gems (but not called Mahâratnas) and the same system of consecration of each to the planets, the same system of nomenclature are to be found in both.[2] Thus, according to Sripati, people should put on the ruby for the sun, pearl for the moon, coral for Mars, emerald for Mercury, topaz for Jupiter, diamond for Venus, sapphire for Saturn, gomeda for Râhu, and vaiduryya for Ketu. This corresponds exactly to what Sukrâchâryya says in lines 84-92 of section ii of Chapter IV. The same system of consecration is followed in the astronomical work, Jâtaka-Pârijâta, which devotes the whole second chapter to a discussion of the nature and properties of planets.

It may be remarked here that the colour and lustre attributed to the nine planetary deities in the hymns called *Navagrahadhyâna* fit in exactly with those described in Sukranîti as pertaining to the gems. Again, the images of *Navagraha* found at Konaraka and near Bhuvaneswara in Orissa are said to belong to temples not earlier than the 10th century.[3] This is Dr. Râjendralâl Mitra's testimony in the *Antiquities of Orissa*. The hymns, the images, the temples, the astrological calculations as well as the evidences of Ratnasâstras—all point to the Doctrine of Navaratna not being older than the 10th century.

(*f*) *Subsequent Literature.*

Of the subsequent literature on the subject, *Yukti-kalpataru* is an important landmark. But though it is based on *Garuḍa*, *Agastya* and *Viṣṇudharmottara*, and though it gives details relating to enumeration, characteristics and prices of the gems, it does not supply valuable information regarding the doctrine of nine gems, as it does not treat of their astral connexions at all.

So also most of the works of the 12th and 14th centuries are not important for our purposes. But *Rasaratna-samuchchaya* of the 13th-14th century, which is a very important document in the literature on metals, mentions in Chapter IV, 5, that Mâṇikya, muktâ, vidruma (*tarkṣya, i.e.*, emerald), puṣpa, vidura (diamond), nîla (sapphire), gomeda and viduraka are successively the ratnas of the nine planets. With the exception of the new terms used in this verse, *Rasaratna-samuchchaya*[1] follows exactly the system in *Sukranîti*. This work mentions other gems as well, but regards these nine as the *navaratna par excellence*. The only point in which this differs from Sukranîti is that it does not apply the term *mahâratna* to these nine gems. The work thus fully agrees with Sripati's Jyotiṣa-Ratnamâlâ (10th-11th cent.).

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[1] For a discussion of dates, see Prof. Ray's *Astronomy of the Hindus.*

[2] But Sripati does not use the word *mahâratna*. Viṣṇudharmottara uses the word *mahâratna*, but his nine mahâratnas are not the same as those of Sukra. If Sripati had taken the word *mahâratna* from *Vishnudh*, his work would have been the original prototype of *Sukranîti*. As it is, it is the earliest authority for the verse in *Rasaratna-samuchhaya* about *Navaratna*.

[3] See the chapter on *Graha* in Prof. Ray's *Astronomy of the Hindus.*

We now come down to *Bhâvaprakâsa* of the 16th century. This work, like the one just described, continues the full tradition originating in the astrological, religious and socio-economic literature of the 9th and 10th centuries. The *Râjanighantu*[2] of the 17th century also mentions the same nine gems as sacred to the same planets.

But the classification of *navaratnas* or nine gems into grades adopted in these two works differs from that in Sukraniti. Sukrâchâryya calls all the nine gems by the name of *mahâratnas*. But *Bhâvaprakâsa*[3] and the *Râjanighantu* mention five of them only as *mahâratnas* and call the rest *uparatnas* (inferior gems).

(*g*) *Recapitulation.*

The historical inquiry into the doctrine of nine gems leads to the following conclusions about the age of the section in *Sukranîti* dealing with gems :

1. The Sukra authors do not display astrological conceptions prior to or even contemporaneous with, those of Varâhamihira (6th cent. A.D.).

2. The doctrine embodied in Sukraniti bears the influence of the following ideas :

(i) The enumeration and appreciation of gems as nine *mahâratnas*[4] adopted by the author of *Viṣṇudharmottarapurâṇa* (10th cent. ?) who quotes *Garuḍa*.

(ii) The system of consecration of the nine gems (not necessarily mahâratnas) to the nine planets followed in *Agastyamatam* (which is probably earlier than Viṣṇudharmottara, but belongs to the same age); as well as in Rasaratna-samuchchaya.

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[1] See Sanskrit Text of the work edited and published by the Anandâsram, Poona, pages 10-12.

[2] See the Hindi Edition (Benares), p. 140.

[3] See *Viswakoṣa* (Vasu's) Vol. IX, (navaratna).

[4] Nine gems are mentioned in (1) Agastya, (2) Viṣṇudharmottara, (3) Jyotiṣaratnamâlâ, (4) Sukranîti, (5) Rasaratna-samuchchaya, (6) Bhâvaprakâsa, (7) Râjanighantu.

Nine mahâratnas are mentioned only in (1) Viṣṇudharmottara and (2) Sukranîti; but the list is not the same in the two works. See the original text of Viṣṇudharmottara quoted in Dr. Sen's *Ratnarahaṣya*.

(iii) The recognition of Râhu and Ketu as the two additional Grahas who should be worshipped along with the old seven, first noticed in the second work of the astrologer, Srîpati, which, however, he had ignored in his earlier work.

3. The doctrine is certainly older than the tradition embodied in Bhâvaprakâsa and Râjanighantu (16th and 17th cent.).

4. The doctrine in all particulars cannot be traced to any work on the subject, and has not been copied in *toto* in any work that we know of. Sukranîti is *sui generis* in this respect.

The date of the second work of Sripati, *viz.*, *Jyotiṣaratnamâlâ* may thus be assigned to be the extreme upward limit of the Doctrine of *Navaratna*, as it contains the first literary evidence of *Navagraha*. This must be placed sometime in the 10th century A.D.

The mineralogical section of *Sukranîti* thus yields two furthest limits of chronology: (1) the 10th century—furnished by the doctrine of nine gems, and (2) the 14th century--furnished by the doctrine of seven metals.

There is one difficulty that remains to be explained. If the doctrine of nine planets be the basis of the doctrine of nine gems, we might expect also a doctrine of nine metals. But, though *Sukranîti* mentions altogether nine metals, it recognises only seven as principal. Or, if the doctrine of seven metals has something to do with the original seven planets, we might expect a corresponding Doctrine of Seven Gems as well. But in India the metals seem to have had no connexion with planets even up to 14th century, as has been discussed in the section on the doctrine of seven metals.

SECTION 11.

The Economic Mineralogy of Sukrâchâryya's India.

The Mahâratnas.

Sukrâchâryya divides the nine great gems into the following four classes in order of merit:—

(1) Vajra, being *Sreṣthatara*, by far the best;
(2) Good or *Sreṣtha :* (i) Marakata, (ii) Mânikya, (iii) Muktâ;
(3) Middling or *Madhyama* : (i) Indranila, (ii) Puṣyarâga, (iii) Vaiduryya;
(4) Inferior or *Nîcha* : (i) Gomeda, (ii) Vidruma or Pravâla.

i. Vajra or Diamond.

This gem is the favourite of the poet, *viz.*, Sukra[1] who is the preceptor of the Asuras and the author of our *Nîtisâstra.* It is very transparent and has the lustre of the star.

This is the best gem.[2] The popular notion about it is that the woman[3] who wants a son should never wear a diamond. This is perhaps one of the hard

Sukra IV, ii, 89. Sukra IV, ii, 93. [3] Sukra IV, 105.

substances which are to be used in cutting[1] or writing upon gems. But it is to be noted that only pearls and corals can be thus incised.

The value of this gem in terms of "money" is given below:—

(1) "The price[2] of one whole diamond weighing one *rati*, but wide in extent, is five *suvarnas* or gold coins.

(2) "The price is five times (*i.e.*, twenty-five gold coins), if it be heavier than one *rati* and superior in extent.

(3) "The price is to be less and less according as the quality falls off."

This is according to the general theory that small weight but large bulk are the conditions of the high worth of jewels. The value may be expressed in terms of *rati* in the following way: "Eight *ratis*[3] make one mâṣâ, ten mâṣâs make one *suvarṇa*." Thus 80 *ratis* make 1 gold coin: therefore 400 *ratis* make 5 gold coins. The ratio of diamond to gold, as expressed in the above extracts, would therefore be 1 to 400; or "exchange-value" of diamond is 400 times that of gold.

This general ratio is to be modified by the following considerations:

(1) Other things remaining the same, the exchange-value[4] is (*a*) one-third less than the above (which determines the 'normal' or 'natural' value), if the stone be flat-shaped, (*b*) one-half, if the stone has the colour of the reddish powder of bricks. [In the general remarks on the value of gems we noticed that this colour is not appreciated.]

(2) Other things remaining the same, the 'exchange-value' (*a*) would be half, if two pieces together[5] weigh one *rati*; (*b*) half of this (*i.e.*, one-fourth of the 'normal'), if the stones be middling or inferior.

(3) Other things remaining the same, the exchange-value of inferior or middling qualities would be determined in the following manner:[6] (*a*) By multiplying the weight in *ratis* by nine-sixteenth. (*b*) By adding together five-sixteenths and one-thirtieth.

The general rule about the determination of the 'money-value,' *i.e.*, price and 'exchange-value' of diamond is given in the following lines:

(1) The value of diamond is according to its *weight* in terms of *rati*.[7] (2) Even in the case of small pieces, the *weight*[8] has to be considered, not number (as with other gems).

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[1] Sukra IV, ii, 109-110, "The gems cannot be cut or written upon by iron or stones (diamonds) except pearls and corals." See p. 142 of my translation of *Sukranîti* in the *Sacred Books of the Hindus Series*.

[2] Sukra IV, ii, 134-137

[3] Sukra IV, ii, 138.

[4] Sukra IV, ii, 140-142.

[5] Sukra IV, ii, 143-144.

[6] Sukra IV, ii, 146-148. Specialists would do well to verify the truth and propriety of those remarks. The comparative prices given here would be discussed in the chapters on the *Data of Ancient Indian Economics* and *Public Finance*.

[7] Sukra IV, ii, 140-142,

[8] Sukra IV, ii, 168.

"In India diamonds occur over three wide areas: (1) the eastern side of the Deccan from the Penner to the Sone, (2) the Madras Presidency, especially in Kistna and Godavari basins, and (3) Chutia Nagpore and Central Provinces to Bundelkhand. It is somewhat remarkable that the Indian diamonds have not as yet been found in what can be called their original matrix. * * * None of the Indian diamond fields can, at the present day, be viewed as of commercial importance, and it is difficult, if not impossible, to identify for certain, all the localities alluded to by classical writers. * * * India was the first and for a long period the only source of diamonds known to the European nations. * * * It appears to have been worn by the nobility of India long anterior to the earliest European mention of it. * * * Tavernier was perhaps the first European who travelled over India with the express purpose of inspecting diamond mines."

The legend of the origin of *Kohinur*[2] is that it was found in the mines of the south of India, and was worn by one of the heroes of the *Mahábhárata*, Karṇa, king of Anga; this would place it about 5000 years ago, or 3001 B. C. Nothing more of it is heard till it appears as the property of Vikramâditya, &c.

ii. Muktâ or Pearls

This is the favourite of the moon,[3] *i.e.*, presided over by this planetary deity, and may have red, yellow, white and syâma (swarthy or greenish blue) colour.

This gem is lower in value than diamond, but superior to the lowest, *viz.*, *gomeda* and *vidruma*, as well as to *indranîla*, *puṣyarâga* and *vaiduryya*, which are middling stones. One characteristic of this jewel is that it can be written upon (like corals) by iron or stones.[4]

In the section on general remarks we noticed that gems cannot deteriorate in value except through the wickedness of kings. But pearls and corals are to be exempted from this generalisation, for they do fade through use[5] in time. The deterioration comes in naturally.

The following are the sources[6] of pearls recorded in *Sukranîti*: (1) fishes, (2) snakes, (3) conches, (4) boars, (5) bamboos, (6) clouds, (7) oyster-shells. The greatest amount is said to come from these last.

This last class of pearls is divided into three grades:[7] (1) inferior, (2) middling and (3) excellent. It is only these pearls, again *i.e.*, those derived from shells as mothers that can be pierced[8] and hence used in ornaments. Those coming from others cannot.

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[1] *Dictionary of Economic Products of India*, pp. 93-101, Vol. III (1890).

[2] See *Note on the History of the Kohinur Diamond* in *Handbook of the Manufactures and Arts of the Punjab*. By Baden Powell (1872), pp. 195-201.

[3] Sukra IV, ii, 85.

[4] Sukra IV, ii, 109-110.

[5] Sukra IV, ii, 106.

[6] Sukra IV, ii, 117-118.

[7] Sukra IV, ii, 122.

[8] Sukra IV, ii, 123. See account of pearl-boring in Baden Powell's *Punjab Manufactures*, p. 192 (1872).

And the people of Ceylon [1] can make artificial pearls like those from shells. One should therefore carefully examine pearls before purchasing them.

The test[2] is given below: "That certainly is not artificial which does not lose colour by being rubbed with *vrîhi* paddy after having been soaked in hot saline water during the night. If it remains very bright it is really derived from shells. If it has middling lustre, it is otherwise."

The *Garuḍapurâṇa*[3] and *Yukti-kalpataru*[4] also describe the industry of the Ceylonese in artificial Pearl-manufacture. *Brihat Saṃhitâ*, *Garuḍapurâṇa* and *Yukti-kalpataru* mention Ceylon, Pâralaukika, Saurâstra (Guzrat), Tâmraparṇi (Malabar), Persia, Kouvera, Pândyavâtaka, and Haimadesa as the eight regions where oyster-pearls are found. According to *Agastyamatam* the places are Ceylon, Arabia, Persia, and Barbara (North Africa).

The following list of pearls is given in order of excellence,[5] the first being the best:—

(*a*) As regards layers or skins :

(1) Those with seven skins or coverings.
(2) Those with five or four skins.
(3) Those with three or two skins.

(*b*) As regards colour : (?)

(1) Red.
(2) Yellow.
(3) White.
(4) Black.

The following is the order of age,[6] the first being the oldest : (?)

(1) Yellow.
(2) Red.
(3) White.
(4) Black.

Both these lists apply only to the pearls derived from oyster-shells.

In connexion with the value of pearls the following things are to be noted :

(1) The *rati* for the measurement[7] of pearls is not the same as that for diamond and other stones. For all gems twenty *Kṣumâs* make one *rati*; but for pearls three *ratis* are made by four *Kriṣṇalas*; and twenty-four *ratis* make one *Ratnatanka*.

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[1] Sukra IV, ii, 124-125.

[2] Sukra IV, ii, 126-128. Specialists may verify it.

[3] Quoted by Prof. Yoges Chandra Ray in *Ratnaparîkṣâ*.

[4] Quoted by Dr. Râmadasa Sen in *Ratnarahasya*.

[5] Sukra IV, ii, 119-120. The correctness of the order may be tested by specialists.

[6] Sukra IV, ii, 121.

[7] Sukra IV, ii, 130-132,

Now as 4 *tankas* [1] make 1 tola of gold, 96 *ratis* (Pearl-standard) make 1 tola of gold.

(2) The exchange-value of pearls varies according as the substance is of inferior, middling, and superior grades.[2]

(3) The standard is either diamond[3] or gold.[4]

The following are the methods prescribed for the calculation of the prices of pearls :—

(*a*) According to Diamond-standard :

(1) If the pearl is of more than a thousand *ratis* in weight, then for every hundred *ratis*, the value would be the same as of a diamond, less three hundred, divided by sixteen. (?)

(2) If the pearl is more than hundred *ratis* in weight, then from every hundred *ratis* deduct twenty *ratis*, and after such deduction the value of each *rati* would be the same as that of the diamond of the first class. Thus if the weight of pearls be 200 *ratis*, the price will be calculated after a deduction of 20 per cent. from the weight, *i.e.*, upon the weight of 160 *ratis*.

(*b*) According to the Gold-standard :

Multiply the weight[6] of the pearls in *ratis* by 13¾ and divide the product by 24, the quotient will be the value of the pearl in so many *ratis* of gold.

The following are some general remarks[7] about the worth of pearls :

(1) The best pearls are valued at half the price of gold.

(2) The best pearls are the red, yellow, round and white.

(3) The worst are the flat ones and those having the lustre of powdered bricks.

(4) The rest are middling.

"Tuticorin has been celebrated for its pearl-fishery[8] from a remote date, and as regards comparatively modern times, Friar Jordanus, a Missionary Bishop, who visited India about the year 1330, tells us that as many as 8,000 boats were then engaged in the pearl-fisheries of Tinnevelly and Ceylon."

Megasthenes' account of Indian Pearls can be gleaned from Arrian's *Indica* (VII—IX) and Pliny's *Natural History* (IX, 55). From the Bengali translation of the Greek original of Megasthenes by Prof. Guha we gather that pearl-fishery was only an application of the ordinary principles of the Fishing Industry. It was known that the oyster shells or the mothers-of-pearls lived in shoals like fishes, and resembled the community of bees with a ruling queen. If the chief could be caught the whole group of oysters fell an easy prey. The shells were kept in a vessel full of salts for some time until the fleshy portion decomposed of itself. The bony portion, the pearls, was then ready for use.

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[1] Sukra IV, ii, 133.

[2] Sukra IV, ii, 149.

[3] Sukra IV, ii, 149-151.

[4] Sukra IV, ii, 166-170.

[5] Sukra IV, ii, 152-154.

[6] Sukra IV, ii, 166-167.

[7] Sukra IV, ii, 168-170.

[8] Pearl and Chank Fisheries of the Gulf of Mannar, by Thurston, Superintendent, Madras Government Museum, p. 9.

According to Megasthenes the value of pearls was equal to three times that of pure gold of the same weight.

iii. Mâṇikya or Ruby.

This is the sun's favourite,[1] of red colour, and has the bright lustre of *indragopa* insect. This belongs to the class of gems intermediate[2] between *vajra*, the best, and the middling ones. It is, therefore, appreciated equally with pearls and emeralds. The comparative values are not stated. We are told simply, as we have seen, that the emerald, if it is good, deserves the price of a ruby.[3] There is one more information about *mânikya, viz.*, that regarding *padmarâga*,[4] which is said to be one of its varieties and has the lustre of red lotus.

> " The name[5] is applied by lapidaries and jewellers to two distinct minerals—the true or oriental ruby and spinel ruby. The former may be called a red variety of corundum, is aluminic oxide. The spinel ruby is an aluminate of magnesium. * * * The ruby receives the name " oriental " from the fact of the finest red and violet varieties being obtained from Ceylon, Ava and other parts of the East. "
>
> " The delicate[6] rose pink variety of spinel, known as balas ruby, was worked for centuries in Badakshan. In the time of Marco Polo the mines were wholly in the hands of the king of Balkh.
>
> " The chief sources, however, both of the oriental and the spinel ruby are the mines of Upper Burma. * * * The ruby mines of Burma were first made known by European travellers towards the end of the fifteenth century * * * rubies come next in value to diamonds. * * Like most other jewels, rubies have some fancied talismanic virtues attached to them. In many parts of India a bracelet formed of nine gems, of which the ruby is one, is supposed to protect the wearer from the evil eye. "

iv. Pâchî, Marakata, Gârutmata or Emerald.

This is the favourite of the planetary deity Mercury.[7] It has the lustre of the feathers of the peacock or of the *châsha* (nilakaṇṭha) bird.

This belongs to the class of pearls and *mâṇikya*,[8] *i.e.*, just inferior to the *vajra* or diamond and superior to the middling class. If the *gârutmata* is good, it deserves the price of a mâṇikya or ruby.[9]

According to *Garuḍapurâṇa* and *Agastyamatam* the source of this gem is Turkey. According to *Ratnasamgraha* it is *Mlechchhadesa*.

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[1] Sukra IV, ii, 84.

[2] Sukra IV, ii, 93-95.

[3] Sukra IV, ii, 157.

[4] Sukra IV, ii, 104

[5] Encyclopædia Britannica—Chemistry.

[6] *Dictionary of the Economic Products of India* (1892), Vol. VI, Part I, pp. 584-589.

[7] Sukra IV, ii, 87.

[8] Sukra IV, ii, 93-95.

[9] Sukra IV, ii, 157.

v. *Indranîla or Sapphire.*

This is the Saturn's favourite,[1] is not white, but has the colour of deep clouds (blue). This belongs to the ***madhyama*** [2] or middling class of gems, like ***puṣyarâga*** and ***vaiduryya***, ***i e.***, just superior to the lowest class comprising *gomeda* and ***pravâla***. The value of indranîla is perhaps the same as that of gold, as can be guessed from the following: "The ***puṣyarâga*** weghing one ***rati*** deserves half the price of *indranila*[3] or gold (of the same weight).

"It is classed [4] with 'gems or precious stones' in contradistinction to the 'inferior gems.' It is a blue transparent variety of corundum ($Al_2 O_3$) and differs from the oriental ruby merely in its colour. * * * Sapphires of various colours occur in India. * * * Sapphire is found along with many other varieties of corundum in the ruby mines of Upper Barma. * * In Ceylon * * sapphires are found frequently. In 1882 a remarkable discovery of sapphires was made in Kashmir territory."

vi. *Vaiduryya.*

Prof. Yoges Chandra Ray considers this to be chrysoberyl (oriental cat's eye), Wilson takes it for *lapis lazuli.*

This is the Ketu's favourite,[5] has the lustre of cat's eyes and has its particles moving.

Like ***indranila*** it belongs to the middling class of gems.[6] That piece whose three rays are coming out deserves high price.[7] Comparative values are not given.

vii. *Puṣyarâga or Topaz.*

This is the favourite of Jupiter[8] and has the brilliancy of gold. It belongs to the middling class[9] of gems.

The piece weighing one ***rati*** deserves, as has been quoted above, half the price of gold or sapphire of the same weight.[10]

"It may be defined[11] as a fluosilicate of aluminia ($Al_2 O_5 Si$). * * The oriental topaz is in reality a yellow sapphire or corundum. Of the occurrence of topaz in India, Ball says, "there appears to be no authentic record, a reported discovery in the basalt of the Rajmahal hills being open to question. Ceylon, it is believed, yields a not inconsiderable proportion of the topaz of commerce."

According to *Garuḍapurâṇa* the source is Himâlaya; according to *Ratnasamgraha*, it is *Karka* and Ceylon.

viii. *Gomeda.*

It is difficult to identify it. It is agate according to Wilson,[12] but zircon according to Yoges Chandra Ray. Information about this is as meagre as about coral in ***Sukraniti.***

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[1] Sukra IV, ii, 90.

[2] Sukra IV, ii, 95.

[3] Sukra IV, ii, 159.

[4] *Dictionary of the Economic Products of India*, pp. 474-475, Vol. VI, Part II.

[5] Sukra IV, ii, 92.

[6] Sukra IV, ii, 94.

[7] Sukra IV, ii, 160.

[8] Sukra IV, ii, 83.

[9] Sukra IV, ii, 94.

[10] Sukra IV, ii, 159.

[11] *Dictionary of the Economic Products of India* (1893), p. 70, Vol. VI, Part IV.

[12] Wilson describes it as a stone brought from the Himalaya and the Indus, having four different colours, *e.g.*, white, pale-yellow, red and dark-blue.

It is the Râhu's favourite,[1] and like coral has yellowish red or orange colour. Like coral again it belongs to the lowest class.[2] Its value is not[3] to be determined by weight like that of all other gems. It does not deserve[4] weighing, as it is very low-priced.

The region is Himâlaya and Sindhu according to *Yukti-kalpataru.*

ix. Pravâla, Vidruma or Coral.

This is the favourite gem of Mars [5] and has yellowish red colour. Like *gomeda*, it is one of the lowest *ratnas.*

It fades through use[6] in time. Like pearls, corals can be cut or written upon[7] by iron and stones (*e.g.*, diamonds). Corals weighing one *tola* deserve half the price of the gold of the same weight.[8]

"In addition [9] to being used for adornment ornamental corals have been used in Hindu medicine from a very ancient time and are mentioned by Susruta. Ainslie remarks that the Tamil practitioners prescribe the red coral when calcined in cases of diabetes and bleeding piles."

SECTION 12.

Miscellaneous.

There are certain substances more or less allied to those dealt with in this chapter that have been referred to by the authors of the Sukra cycle in their description of the kalâs, the artisans, the industries and the Ordnance Department. These should be noted in an account of the mineralogical data available from the *Sukranîti.*

One of the general rules for the guidance of kings is that they should accumulate for future purposes such things as are useful to man. Among these are mentioned minerals,[10] implements, arms, weapons, gunpowder, vessels, etc.

1. *Sulphur.*

Sulphur[11] has been mentioned as an ingredient of gunpowder.[12] The following are the recipes for this preparation :

(1) Five *palas*[13] of *suvarchi* salt (saltpetre), one *pala* of sulphur, and one

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[1] Sukra IV, ii, 91.

[2] Sukra IV, ii, 93-95.

[3] Sukra IV, ii, 129.

[4] Sukra IV, ii, 162.

[5] Sukra IV, ii, 86.

[6] Sukra IV, ii, 106, 115-116.

[7] Sukra IV, ii, 109-110. The reader is requested to note the change in the translation given here from that given on p.142 of the Vol. XIII of the *Sacred Books of the Hindus Series.*

[8] Sukra IV, ii, 161.

[9] *Dictionary of the Economic Products of India*, p. 532, Vol. II (1889).

[10] Sukra IV, ii, 60-63.

[11] The use of sulphur in medicines as copper sulphate, and iron sulphate (copperas) is as old as *Charaka Saṃhitá.*

[12] Dr. Râjendralâl Mitra, who discovered the *Sukranîti* in 1875, doubts the authenticity of these lines (vide *Indo-Aryans*, Vol. I, pp. 309-12). But Dr. Gustav Oppert, who edited and published the Text for the Madras Government in 1882, proves by quotations from Vedas, Asoka's Edicts &c., that "firearms and gunpowder existed in Ancient India." See his preface to *Sukranîti* published by Madras Government, also his essays on the authenticity of Sukranîti, and *Firearms and weapons in Ancient India* published by Higginbotham & Co., Madras (1880).

[13] Sukra IV, vii, 400-404.

pala of charcoal from the wood of *arka* (Calotropis gigantea), *snuhi* (Euphorbia neriifolia) and other trees burnt in a manner that prevents the escape of smoke have to be purified, powdered, and mixed together, then dissolved in the juices of *snuhi*, *arka*, and garlic (Allium sativum), then dried up by heat, and finally powdered like sugar.

(2) Six or four parts[1] of saltpetre may also be used in the preparation of gunpowder. Sulphur and charcoal would remain the same.

(3) Experts make gunpowders in various ways[2] and of white and other colours according to the relative quantities of constituents :—Charcoal, sulphur, saltpetre, stones, *haritâl* (orpiment)[3] lead, *hingul*, iron calces (oxides), camphor, *jatu* (lac), indigo, juice of *sarala* tree (Pinus longifolia).

The use of salts, *e.g.*, Suvarchi or saltpetre,[4] has been referred to in the above recipes.

The mention of sulphur introduces us to a fact of great economic importance, and furnishes a solid basis for interpreting certain phases in the industrial history of India. "Chemical and metallurgical industries," says Mr. Holland, Director of the Geological Survey of India,

> "are essentially gregarious in their habits. * * * The bye-product is a serious and indispensable item in the sources of profit, and the failure to utilise bye-products necessarily involves neglect of the minerals which will not pay to work for the metal alone."

The demand for sulphur in ancient India and the consequent supply of it in response necessarily involved, according to this 'principle of association' which is really an aspect of the Doctrine of the "Localisation[5] of Industries," a good number of auxiliary and allied industries in mining, metallurgy and manufacture, utilising the bye-products. The fact that there are no such auxiliary industries in modern India is the real explanation, according to Mr. Holland, of why a good many otherwise rich metalliferous ores cannot be worked.

We can easily turn this economic fact of modern times to account in understanding the industrial situation of the country in by-gone days. Thus we are led to infer the existence in ancient India, side by side with the sulphur industry, of all those to which it is a key. Says Mr. Holland :

> "Sulphuric acid is essential for the manufacture of sulphur-phosphates, the purification of mineral oils and the production of ammonium sulphates, various acids, and a host of minor products; it is a necessary link in the chain of operations involved in the manufacture of the alkalies, with which are bound up the industries of making soap, glass,

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[1] Sukra IV, vii, 405-406.

[2] Sukra IV, vii, 411-415.

[3] "Most of the older Sanskrit MSS. are written on paper prepared with haritâla to preserve them from the ravages of insects, and this it does most effectually"—Dutt. Dr. Mitra also describes arsenicised paper in his report on Sanskrit MSS. in the proceedings of the Asiatic Society for March, 1875.

[4] This salt has been mentioned in *Charaka Saṃhitâ* and *Susruta Saṃhita* also.

[5] Illustrated in modern Europe by the contiguity of Iron and Coal Industry. "Many of the most profitable copper mines in the world could not be worked but for the demand for sulphur in sulphuric acid manufacture, and for sulphuric acid there would be no demand but for a string of other chemical industries in which it is used."

paper, oils, dyes, and colouring matters; and as a bye-product it permits the remunerative smelting of ores which it would be impossible otherwise to develop."

Industry in ancient India must therefore have been more richly diversified than at present. In fact, the extinction of several industries in modern India is explained by Mr. Holland in the following lines:

"During the last hundred years the cost of a ton of sulphuric acid in England has been reduced from £30 to under £2, and it is in consequence of the attendant revolution in the Europen chemical industries, aided by increased facilities for transport, that in India the manufactures of alum, copperas, blue vitriol, and alkalies have been all but exterminated; that the export trade in nitre has been reduced instead of developed; that copper and several other metals are no longer smelted; that the country is robbed every year of nearly 1,00,000 tons of phosphatic fertilisers, and that it is compelled to pay over 10 million sterling for products obtained in Europe from minerals identical with those lying idle in India."[1]

And this state will continue "until industries arise demanding a sufficient number of chemical products to complete an economic cycle."

Exactly the reverse must have been the condition of manufacture and commerce in ancient India, and for the opposite reasons.

In the Economic Volume[2] of *the Indian Empire,* also, in the *Imperial Gazetteer of India Sries,* Mr. Holland harps on this decline of ancient chemical industries:

"In this respect India of to-day stands in contrast to the India of a century ago. The European chemist, armed with the cheap supplies of sulphuric acid and alkali * * * has been enabled to stamp out, in all but remote localities, the once flourishing native manufactures of alum, the various alkaline compounds, blue vitriol, copperas, copper, lead, steel and iron, and seriously to curtail the export trade in nitre and borax. The high quality of the native-made iron, the early anticipation of the processes[3] now employed in Europe for the manufacture of high class steels and the artistic products in copper and brass gave the country a preminent position in the ancient metallurgical world, while as a chief source of nitre India held a position of peculiar political importance, until less than forty years ago, the chemical manufacturer of Europe found, among his bye-products, cheaper and more effective compounds for the manufacture of explosives."

2. *Glass.*

Râjendralâl says that the word Kācha for glass occurs in works considerably over 2,000 years; and "seeing that the Singhalese who borrowed all the arts of civilised life from the Hindus, make mention, in the *Dipavamsa,* of a glass pinnacle, in the 2nd cent. B. C., and of a glass mirror in the 3rd cent. B. C. (Tennent's Ceylon I, 454), and Pliny describes the glass of India being superior to all others from the circumstance of its being made of pounded crystal it would not be presumptuous to believe that it was in ancient times used in India in the formation of looking glasses."

In *Indo-Aryans* Vol. I, Dr. Râjendralâl also refers to the knowledge which the Hindus had of glass as a material for the fabrication of ornaments;

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[1] Review of the Mineral Production of India during the years 1898-1903 By T. H. Holland, F.R.S. (1905), see pp. 7-8, 117.

[2] Chapter III, Mines and Minerals, p. 129 (Oxford, 1907).

[3] See *Hindu Chemistry,* Vol. II., for Seal's account of Hindu achievements in chemical industry.

but from a passage in the *Yukti-kalpataru* it appears that it was also used for drinking cups or tumblers, the physiological effect of drinking water from vessels of glass being described to be similar to that of vessels made of crystal.

In *Sukraniti* Glass has been mentioned only once. The making of glass[1] vessels is a *kalâ*.

About the antiquity of glass in India, Mr. Jayaswal remarks in reviewing Dr. Schoff's *Periplus* for the *Modern Review*:

> "*Glass* in India was a manufacture long before it became known to Ceylon (3rd century B.C.,) The Artha-Sâstra calls false gems "glass-gems," and mentions the manufacture of glass. Pliny's description that the glass of India was superior to all others, because it was "made of pounded crystal" and because of the discovery made by the Hindus of the art of colouring crystal, indicates a long previous history of the industry in this country. Coloured glass was well-known to the Artha-Sâstra. The glass-worker, called at present *Maniyâra*, is mentioned by the very name (Manikâra) in the Mahâvastu.

The following are the remarks of Dobbs:

> "The manufacture of glass[2] was known in ancient India as early as 800 B.C., for in *Yajurveda* glass is mentioned as one of the articles of which female ornaments were made. It is also noticed in the *Mahâbhârata*, and in an old book called the *Yukti-kalpataru* that the effects on the human system of drinking water out of a glass tumbler are stated to be the same as those of drinking out of a crystal cup. In more recent times, in the 16th century, the glass of India is said to have been exported in large quantities to Europe, and in the north of Italy there is a tradition that the Venetians at one time obtained, if not their raw glass at least its ingredients, from the plains of Hindusthan."

Mr. Taw Sein-kaw also bears testimony to the antiquity of Indian pottery, both glazed and earthen, and to its having influenced the pottery and glassware of Burma.[3] "The ceramic art did not achieve any public recognition in Europe till the 16th century A. D, but long before that period the pottery of Burma had become famous." Ibn Batuta, the celebrated Arabian traveller of the 14th century, also recorded the fact.

In Yub's *Hobson-Jobsan* we have the following:—

> "In this town of Martaban (now a small village in Amherst district) are made very large and beautiful porcelain vases, and some of glazed earthenware of a black colour, which are highly valued among the Moors, and they export them as merchandise."

And Mr. Seinkaw observes that Taikkalâ, one of the most important seaports of the country governed by the rulers of Martaban:

> "was colonised, (as the name implies), by the Gaudas of the ancient city of Gour in Bengal. On the site of this historic Taikkalâ, traces of a wall and moat still exist, and fragments of pottery and glazed tiles are found."

3. *Alkalies.*

Alkalies also have been mentioned in *Sukraniti* as *Kşâras*. Thus one of the 64[4] arts or *kalâs* is the extraction or preparation of alkalies. Government revenue from this chemical industry is declared to be one-half[1] of the produce after the costs have been met.

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[1] Sukra IV, iii, 191.

[2] See *Monograph on the Pottery and Glass Industries of the North-Western Provinces and Oudh* by Dobbs (1895, Chapter IX, p. 29).

[3] *Monograph on the Pottery and Glass ware of Burma* (1894-95), pp. 2-3.

[4] Sukra IV, iii, 150.

4. *Stones.*

Stones have been referred to several times. We have just seen that these may be used as ingredients for gunpowder. Their use in statuary, iconography, and sculpture has been mentioned by the Sukra authors in their description of the images of gods. We have already alluded to this in connexion with metals.

We are told that stones are next in importance to metals in the construction of images in point of durability,[2] and superior to all other materials, *e.g.*, sands, pastes, paints, enamels, earth, wood, &c. The responsiblity of the sculptor, therefore, is very great. For he must have to be well up in the conventions of the art. His workmanship would not be appreciated unless it conforms to the exact rules laid down by the masters of *Silpasâstras.*

The images that are made of less durable material are not examined by people very critically, and hence may be executed without particular care. But stone being a durable material involves on the artist an extra amount of carefulness.

But such stones as are found in hills and rivers may be used for religious purposes without human art being made to work upon them. Defects of[3] measurement are not to be noticed in such images, *e.g.*, the natural *Vânalingas* of the *Narmadâ* valley, Chandrakânta gems, or stones found in the Gandaka river.

When stone images are constructed the worshippers should observe a rule with regard to the colour of the material used. "The white stone[4] is prescribed for the Satyayuga as indicating *sâttwika* type of images, the yellow and red stones are prescribed for Tretâyuga and Dwâparayuga respectively as indicating *râjasika* type, and the black stones for the Kaliyuga as indicating *tâmasika* type. These types of images will be discussed in a subsequent chapter.

Image worship being a universal feature of Indian religious life, the industry connected with stones must be expected to have been a very rich one in the days of Sukra authors, as in all ages in Indian history. Not in religious life only, but in other departments of the social life of the people also, stone-quarrying, stone-carving, stone-inlaying as well as other industries and fine arts connected with the manipulation of sandstones, building stone, granite and marble, have played a conspicuous part. Hence in *Sukraniti* we find that among the sixty-four *kalâs* there is one connected with stones.[5]

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[1] Sukra IV, ii, 233-35.

[2] Sukra IV, iv, 150-151.

[3] Sukra IV, iv, 305-308.

[4] Sukra IV, iv, 310-313.

[5] Sukra IV, iii, 167-168.

This consists in the art of cleansing, polishing, dyeing, rinsing, &c., of stone vessels. There is another art also mentioned by Sukrâchâryya as being an auxiliary of Ayurveda. This is the melting and incineration of stones.[1]

Again, stone-carvers[2] are sufficiently important to be recognised by the statesmen of the Sukra cycle in their enumeration of the artists and artisans whom the state should " protect " by finding suitable employment.

It is stated by Fergusson that there is no stone architecture in India earlier than the 3rd century B.C. But says Mr. Crosthwaite :[3]

> "The negative fact that no stone architecture previous to Aśoka has yet been discovered, does not justify the positive conclusion arrived at by Fergusson. * * * The famous Sâranâth stupa and the stupa near Kasia in Gorakhpur are even older than the 3rd century B.C. The excavation of a stupa at Piprahwa in Basti District yielded a casket bearing an inscription in the character of the 3rd or 4th century B.C. * * * The stone mason's art must have existed in India for some centuries before Aśoka's reign."

The following refers to Southern India :

> " Early stone-carving reached a high degree of perfection, first under the Buddhists in India and even sometime before it,[4] * * * following the Buddhists each successive Hindu dynasty left examples of their particular styles. * * * Towards the end of the Hindu period the Vijayanagara kings were the greatest patrons of stone-carving.
>
> "The perfection [5] to which the art of stone-carving was carried and the proportions attained by the industry can be readily, if roughly, gauged by the extent of the architectural remains still in existence, and the profusion and finish of the ornamental work with which they are enriched. The proportion which the decorative industry bore to the constructive defies accurate computation, but judged by European standards it must have been extraordinarily high. "

Mr. Vincent Smith[6] testifies to the skill of Hindu lapidaries :

> "Hindus, as Mr. King observes, were among the earliest of mankind to attain to mechanical perfection and facility in the treatment of the hardest stones, executing with facility many operations which would baffle the skill of the most expert modern lapidary; such as boring fine holes with the greatest precision, not merely through the sardonyx, but even through the sapphire and the ruby. All considerable collections of Indian antiquities comprise numerous specimens of pierced beads made of various precious and semi-precious stones, which display the complete mastery of the old craftsmen over the most different material."

Regarding the use of stones in the manufacture of sofas, chairs, benches, etc., in Hindu India, the following is quoted from *Indo-Aryans* :[7] "Of stones, the gritty sandstone alone was condemned, and the other kinds recommended, with the proviso that the colour of the stone should correspond with that of the planet which presided for the time being on the destiny of the person who was to use the seat; thus when a man happened to be under the influence of Saturn, he had to use a stone seat of a blue colour, but if Venus happened to be the presiding planet, a bright yellow stone was the most appropriate."

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[1] Sukra IV, iii, 145.

[2] Sukra II, 397-398.

[3] Monograph on Stone Carving (1906).

[4] *Monograph on Stone-carving and Inlaying in Southern India* by Rea (1906).

[5] *Stone-carving and Inlaying in the Bombay Presidency* by Tupper (1906).

[6] History of Fine Art, p. 355.

[7] Sukra I, 252-53.

Regarding evidences for the treatment of stones in Hindu Architecture and Sculpture, besides the works of the historians of Indian Art, previously referred to several times, some of the unpublished collections of private associations in Bengal deserve a special mention. Such literary bodies are the *Bangîya* Sâhitya Parisat of Calcutta, Rangpur Sâhitya Parisat, Dacca Sâhitya Parisat, etc., and District Council of National Education, Malda, whose collections[1] of Gauḍa and Pandua relics were exhibited by the distinguished antiquarian, Râdhes Chandra Seth, at a conference of the men of letters belonging to North Bengal. But the most considerable are the recent finds of the Varendra Research Society in Râjsâhi. All these stones have opened up a new field for students of Indian art-culture and archæology.

The explorations of this last academy have presented us with some of the most exquisite specimens of stone images of various Buddhistic and Hindu gods and goddesses of the Tantric type, which should have a place in the sculpture-gallery of the nation, as embodying probably the ideals of an yet unstudied School of Hindu Art. We have also inscribed stone-pillars and monuments which reveal altogether unknown facts of the political, economic, and commercial history of Eastern India in mediæval times (8th—13th cent). To quote Mr. Akṣaya Kumâr Maitra, the guide and philosopher of the Varendra school of historical research: "These and similar inscriptions show at a glance of what stuff were made the people of old Bengal, who at one time extended their empire from shore to shore, between the Himalayas on the North and the Vindhya on the South, and what constituted the high education of the people of that age." Further, "although the Pâla kings were Buddhists, their hereditary ministers were all Brahmans. * * * Bhatta Gurava, the builder of this monument, was not only a pious Brahman, but was also an efficient minister of state, a valiant warrior, and a poet who used to be looked upon by his contemporaries as a Vâlmîki of the *Kalikâla*."

The most important stone pillars brought to prominent notice by this school of historians are (1) the inscribed *Garuḍastambha* pillar (in Dinâjpur), (2) the inscribed pillar of the Kâmboja king—a carved pillar of black basalt (in Dinâjpur), (3) the pillar of the Kaivarta leader—a stone monolith "which may be looked upon as a finger-post to indicate the decline and fall" of the Pâla Empire.

Stone-images of Viṣṇu, Durgâ, Sun-god, Bodhisattva, etc., found by the Varendra Research Society, as well as other materials in their possession enable Mr. Maitra to make the following remarks with regard to what may be proved to be the site of the capital of an old prosperous empire in the modern district of Malda, lying north to south on the east of the river Mahânandâ: "It was indeed a city of palaces,[1] a city of gardens, and a city of fine tanks. * * * These suburban areas (including modern Pandua, Kaligrâma,[2] and other modern villages) enjoyed for a long time a great reputation as an important centre of the old weaving industry of Bengal. * * * Towards the south of the great city, there was another suburb, modern Mâdhâipur, still remembered as one of the traditional centres of Sanskrit education in the Empire of Gauḍa under the Hindus, before Nadia asserted its influence. * * * Old Malda was the port of the city connected with the Far East as well as with the historic markets of the western world."

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[1] See the full report of the Malda Conference (1911) published in Bengali (1913) by the *Sâhitya Parișat* of Rangpur.

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[1] See *Stones of Vârendra*—in the *Modern Review*, June, August and September 1912.

[2] An important Tantric image of the goddess, popularly called Bhairavi, in the vicinity of Kaligrâma, has been brought to the notice of the literary world by Mr. Haridâsa Pâlit, of the District Council of National Education, Malda, and described with illustration in the Bengali monthly, the *Grihastha*, Calcutta.

CHAPTER V.

THE DATA OF ANCIENT INDIAN BOTANY.

SECTION 1.

Sukranîti an a source of Botanical Information.

In *Sukranîti* references to plants and plant-life fall into three classes :

1. The *Nîtisâstra* being the architectonic or dominant science, whatever has any influence on human and social life must be discussed in it. Treatment of botanical topics thus has a very natural place in *Sukranîti.* In Hindu literature there is the tradition of Varâhamihira, the scientist of the 6th century A.D., having treated of more than a thousand phenomena of Nature as affecting the well-being of humanity in his celebrated treatise, *Brihat Samhitâ.*

2. The flora of a locality as well as the Botanical ideas obtaining in any epoch cannot but leave their mark on the literary activities of a people. The casual references of authors to vegetation, the features or habits of plants, and their uses in social life are some of the internal evidences which may be interpreted as telling the story of the author's range of experiences. Like the Data of ancient Indian Mineralogy and Geography, the Data of ancient Indian Botany that may be culled from a study of the flora in Sukranîti would thus furnish important clues to the home and surroundings as well as the epoch in which the authors of the Sukra cycle flourished. For in the first place, types of flora vary from province to province, and secondly, the knowledge about plant-life changes from epoch to epoch. The Botanical references in Sukranîti, therefore, must carry with them the 'spirit' of both Space and Time.

3. The authors of the Sukra cycle have not treated of plants *as plants*, but as substances having a direct or indirect bearing on the social, economic and political topics that concern them mainly. The treatment of plants in *Sukranîti* is, therefore, not at all what should be expected in Botany as an *abstract science*, but is purely *utilitarian* or economic. The Economic Botany of Sukrâchâryya, again, eschews the medical or Ayurvedic, and industrial or artistic branches, but is treated of only in the following aspects : (1) Agriculture, (2) Horticulture and (3) Forestry.

SECTION 2.

Identification of the Sukra Flora.

The trees, plants, shrubs, creepers, &c., mentioned in Sukranîti are being shown in three schedules.[1] The first schedule contains the plants grouped together by the authors of the Sukra cycle under the common name of *Phalinah* or fruit-bearing. The second schedule contains the plants grouped together in the treatise under the common name of ***Kantakinah*** (thorny) and ***Âraṇyaka*** (growing in forests).

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[1] See the lists in Meyen's *Botanical Geography* (Ray Society, London, 1846), pp. 290-395.

The classification is not at all scientific according to the principles of modern Botany, nor does it indicate any cleverness from the ordinary standpoint of the layman. For even as yielding edible fruits some of the plants mentioned in the second list might be well-placed in the first.

The third schedule contains the trees, plants, or shrubs to which only casual references have been made.

(*a*) *The Phalinah or Fruit-bearing Trees.*[1]

It is to be noted that the term fruit-bearing has not been used in the strict Botanical sense of Phanerogams, which, being flowering plants, are necessarily also fruit-bearing. The Sukra authors mean simply that these trees grow fruits either in abundance or such as are appreciated by men as edibles or articles of commerce.

SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
1. **Udumvara** ...	...	*Ficus glomerata* ...	Sub-himalayan tract and outer valleys, in ravines, on the banks of rivers and in damp places, Ajmere-Merwara, Aboo, Behar, Chutia Nagpur, Bengal plains, Khasi Hills, Chittagong, Lower Burma, Irrawadi valley, Western Peninsula, Central Provinces.
Aśwattha	Holy fig-tree (Peepul).	*Ficus religiosa*	Indigenous in the Sub-himalyan tract. Cultivated throughout India. Rare in the arid regions of N. W. India. Common on and destructive to buildings in Bengal. Sacred to Hindus and Buddhists.
3. **Vata**	Banyan	*Ficus bengalensis*	Commonly planted by the Hindus throughout India as far north as Peshawar and in the outer Himalaya as high as 4,000 feet.
4. **Chinchâ**	Tamarind	*Tamarindus indica*	Cultivated throughout India and Burma. Self-sown in waste and forest lands. The fruit does not ripen west of Amballa.
Chandana	Sandal	*Santalum album*	Indigenous in W. Peninsula. Grown in gardens north as far as Saharanpur.
6. **Jâmbhâla**	Lime—acid and sweet, citron, lemon.	*Citrus medica*	Kumaon, C. P., Sikkim, Garo Hills, Satpura Hills, Western Ghats, Chittagong, Khasi Hills.

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[1] See Botanical Volume of the *Bombay Gazetteer* (1886), *Indian Trees* by Brandis, *Indigenous Drugs of India* by Kanny Lall Dey and *Dictionary of Economic Products* by Watt.

	SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
7.	Kadamba	...	*Nauclea cadamba*	Terai and outer hills of Sikkim to 3,000 feet, evergreen forests of North Kanara, Northern Circars, Cuddapah and Karnul, Eastern slopes of the Pegu Yoma. Commonly planted.
8.	Aśoka		*Jonesia asoka*	Khasi Hills, Arakan, Tenasserim, Western Peninsula, Northern Circars, and in evergreen forests of the Kankan and Kanara. Frequently planted, chiefly near temples in India and Burma.
9.	Vakula		*Mimusops elengi*	Western Peninsula, southwards from Kandala Ghat on the west and Northern Circars on the east. Commonly planted, north as far as Lahore.
10.	Vilwa	Bael tree	*Ægle marmelos*	Wild in the Sub-himalayan tracts and outer hills from the Jhelum eastwards, also in S. India and Burma. Cultivated throughout India on account of its fruit.
11.	Amrita	Pear tree (Nâṣpâti in Hindi).	*Pyrus communis*	Largely cultivated in N. W. Himalaya.
12.	Kapitthaka (Kât bel in Hindi).	Wood-apple	*Feronia elephantum*	Generally cultivated in both peninsulas. Indigenous in S. India and Ceylon. Bark used as a cosmetic.
13.	Râjadana		*Mimusops hexandra*	Banda District, sandstone of Pachmarhi and adjoining hill ranges, Chanda District, Gujrat, Khandesh, Deccan, Srihari Kota.
14.	Âmra	Mango	*Mangifera Indica*	Indigenous in Burma, Sikkim, Assam, Khasi Hills, Satpuras, W. Ghats. Cultivated all over India and Burma, excepting the northern part of the Punjab.
15.	Punnâga		*Calophyllum inophyllum.*	On the west coast from Bombay, on the east coast from Orissa southwards. Often cultivated, Saline tracts, Minbu District, Upper Burma.
16.	Kâṣṭhâmra		*Myrica sapida*	Outer Himalaya from the Ravi eastwards.

	SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
17.	Tuda	Mulberry	(1) *Morus alba*	(1) Punjab plains, Kashmir, N. W. Himalaya.
			(2) *Morus indica*.	(2) Wild in the Sub-himalayan tract in dry forest from the Sutlej eastward. Extensively cultivated to feed the seedworm in Bengal and Burma.
18.	Champaka		*Michelia champaka*,	Wild on the Western Ghats in the southern portion, in Sikkim (up to 3,000 feet) and in Lower Burma. Cultivated in the moister parts of India and Burma, shady valleys in Singhbhum.
19.	Nîpa	...	Variety of *Jonesia asoka*.	
20.	Koka	Wild date tree	*Phœnix sylvestris*	Indigenous and gregarious in many parts of India. Planted largely. Mats and baskets made of leaves. Sugary juice extracted in the cold season.
21.	Âmra		*Spondias gifera*.	Sub-himalayan tract and outer valleys to 3,000 feet from the Chenab eastwards. Salt range in the Punjab, deciduous forests of Burma and the Western Peninsula.
22.	Sarala	Pine	*Pinus longifolia*	Sub-himalayan tract and outer Himalaya, abundant as far east as Nepal ; not in the inner arid valleys. Further eastward less common, in Sikkim usually on dry southern slopes. It is supposed that the rainfall in the Sub-himalayan tract here is too heavy for this species (Gamble's *Darjeeling List* Ed. ii. 1883).
23.	Dârima	Pomegranate ...	Punica *granatum*	Indigenous in Persia and Afghanistan. Cultivated. Naturalised in India from remote antiquity.
24.	Akṣota	(1) Walnut (âkhrot in Hindi).	(1) *Juglans regia* ...	(1) Indigenous trans-Indus in the Kurram valley, N.-W. Himalaya, *Sikkim*.
		(2) Indian walnut.	(2) *Aleurites moluccana*.	(2) *Indigenous probably in the Malaya Archipelago. Cultivated in most tropical and subtropical countries, and here and there naturalised.*

	SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
25.	Śiṃśupâ ...	...	*Dalbergia sissoo* ...	Sub-himalayan tract and in outer valleys from the Indus to Assam. Extending far into the plains along river banks. Planted and often selfsown throughout India.
26.	Bhissata.			
27.	Vadara	Jujube (kool in Bengali).	*Zizyphus jujuba* ...	Indigonous and naturalised throughout India and Burma. Grown in gardens for its fruit.
28.	Nimba	Neem or Margoza.	*Azadirachta indica*	Wild in the dry region of the Irrawady valley. Cultivated and naturalised throughout India, rare west of the Sutlej.
29.	Śimbhu.			
30.	Jambîra	Lime ...	Variety of *Citrus medica.*	
31.	Kṣirika	...	Variety of *Mimusops hexandra.*	
32.	Kharjura	...	(1) Variety of *Phœnix sylvestris.*	
		(2) Date-palm	(2) *Phœnix dactylifera.*	(2) Cultivated and selfsown in Sind and Southern Punjab, attempts to grow it have been made in other parts of India.
33.	Deva karaja ...		*Pongamia glabra* ...	Common near banks of streams and water-courses in both peninsulas. Travancore, Oudh Forests, here and there in Sub-himalayan tract, ascending to 2,000 feet.
34.	Phâlgu ...	Opposite-leaved fig tree. (?)		
35.	Tâpinchchha[1] (Tamâla).	...	Variety of *Garcinia xanthochymus.*	
36.	Simbhala.			
37.	Kuddâla ...	Ebony	*Diospyros melanxylon.*	Common in deciduous forests of C. P., Chutia Nagpur, Behar and W. Peninsula.
38.	Lavalî		(1) *Phyllanthus distichas.*	(1) In gardens throughout India.
			(2) *Anona reticulata*	(2) Cultivated over a great part of India.

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[1] It is to be noted that *Tâpinchchha* is a variety of *Tamâla* (Garcinia xanthochymus) included in the list of wild flora in *Sukranîti*.

SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
39. Dhâtrî ...		*Woodfordia floribunda.*	Widely spread from tropical Africa, Arabia to India, ascending to 5,000 feet in the Himalaya and to both peninsulas.
40. Kramuka	Betel-nut	*Areca catechu*	Cultivated in the tropical and sub-tropical regions of India and Burma, in gardens and orchards on the W. coast and in N. Bengal. The seeds are an important article of trade, the spathes are used to write upon, to wrap up parcels, and as covering leaf of cheroots in Burma.
41. Mâtulungaka...	Citron	Variety of *Citrus medica.*	
42. Lakoocha		*Artocarpus lakoocha.*	Sub-himalayan tract and outer hills, from Kumaon eastwards, ascending to 4,000 feet Khasi Hills. Burma, evergreen forest of the Western Ghats from the Konkan southwards.
43. Nârikela	Cocoanut	*Cocos nucifera*	Cultivated throughout the tropics, chiefly in the vicinity of the sea, but also inland.
44. Rambhâ	Plantains	*Musa sapientum.*	Extensively cultivated throughout India, nearer coast tracts than inland.

The list of fruit-bearing trees in the Sukra Flora contains 44 plants. Of these four have not been identified, *viz.*, (1) Bhissata, (2) Śimbhu, (3) Simbhala and (4) Phâlgu. The remaining 40 plants belong to 35 species, as four species have been mentioned in varieties comprising nine plants, *e.g.*, (1) *Citrus medica* as Jâmbhâla, Jambîra, and Mâtulungaka, (2) *Jonesia asoka* as Asoka and Nîpa, (3) *Mimusops hexandra* as Râjadana and Kṣirika, (4) *Phœnix sylvestris* as Koka and Kharjura.

These 35 species are grouped under the following 19 Natural Orders :—

I. Rutaceæ	(1) Citrus medica.
	(2) Ægle marmelos.
	(3) Feronia elephantum.
II. Urticaceæ	(1) Ficus glomerata.
	(2) Ficus religiosa.
	(3) Ficus bengalensis.
	(4) Morus alba or Indica.
	(5) Artocarpus lakoochu.
III Leguminosæ	(1) Tamarindus indica.
	(2) Jonesia asoka.
	(3) Dalbergia sissoo.
	(4) Pongamia glabra.

IV.	Santalaceæ	Santalum album.
V.	Rubiaceæ	Nauclea cadamba.
VI.	Sapotaceæ	(1) Mimusops elengi. (2) Mimusops hexandra.
VII.	Rosaceæ	Pyrus communis.
VIII.	Anacardiaceæ	(1) Mangifera indica. (2) Spondias mangifera.
IX.	Magnoliaceæ	Michelia champaka.
X.	Palmaceæ	(1) Phœnix sylvestris. (2) Areca catechu. (3) Cocos nucifera.
XI.	Coniferæ	Pinus longifolia.
XII.	Juglandaceæ	Juglans regia.
XIII.	Meliaceæ	Azadirachta indica.
XIV.	Euphorbiaceæ	Phyllanthus distichas.
XV.	Musaceæ	Musa sapientum.
XVI.	Guttiferæ	(1) Calophyllum inophyllum. (2) Garcinia xanthochymus.
XVII.	Myricaceæ	Myrica sapida.
XVIII.	Ebenaceæ	Diospyros melanxylon.
XIX.	Lythraceæ	(1) Woodfordia floribunda. (2) Punica granatum.

(*b*) *The Âraṇyaka Trees.*

The following list contains the names of trees which, according to Sukrâchâryya should be planted in forests :—

SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
1. Khadira	Catechu	*Acacia catechu*	Sub-himalayan tract from the Indus eastwards, generally gregarious on islands and on the banks of rivers at their entrance into the plains. Common on the Aravalli Hills and in the W. Peninsula, as well as Burma, Central Provinces, Chutia Nagpur, Behar.
2. Asmanta	Oxalis, (?) probably Indian hemp.	*Crotalaria burhia*	Common in the plains of Sind, Punjab, W. Rajputana and Gujarat.
Sâka	Teak	*Tectona grandis*	Indigenous in both peninsulas. In W. India attains its northern limit in W. Aravallis at 24°42′ N. Lat. In C. India its northernmost point is Jhansi. Cultivated in Bengal and Assam and in N. India as far as Dehra Dun.

SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
4. Agnimantha		*Premna integrifolia.*	West Peninsula, Bengal, Burma.
5. Syaunáka		*Oroxylum indicum*	Sub-himalayan tract from the Jumna eastwards. Rare west of the Jumna.
6. Vabbula ..		*Acacia arabica*	Indigenous in Sind and Northern Deccan, including Berar and Khandesh. Cultivated and naturalised throughout India, except in the most humid regions. The pods are excellent cattle-fodder. Gum exudes largely from wounds in the bark.
7. Tamâla		*Garcinia xanthochymus* or *Cinnamonum tamála.*	Sikkim, Assam, Khasi, Chittagong, W. Peninsula, Circars, W. Ghats, N. Kanara.
8. Sâla		*Shorea robusta* ...	Two irregular, but fairly defined belts : (1) Sub-himalayan belt from Kangra valley to Darrang (Assam). Further to N. W. the cold is too severe, further east, the climate is too moist. (2) Central Indian belt extends from Coromandel coast west to Pachmarhi sandstone hills and south to Godavari river.
9. Kutaja		*Holarrhena antidysenterica.*	Sub-himalayan tract, from the Chenab eastwards, common in sâl forest. Aravalli Hills, Behar, C. P. western Peninsula, Bengal. One of the trees to be employed in reclaiming waste lands.
10. Dhava		*Anogeissus latifolia*	Sub-himalayan tract from the Ravi to Nepal, C. I., Western Peninsula, Chutia Nagpur, Behar, Orissa. Not in Assam, Eastern Bengal nor Burma.
11. Arjuna		*Terminalia arjuna*	Common on the banks of rivers, streams and dry water courses in C. I. and S. Behar, in the Peninsula and Ceylon, Jammu, Chutia Nagpur. Here and there in Sub-himalayan tract. Not in east and Central Bengal, nor in Burma.
12. Palâsa		*Butea frondosa* ...	Common throughout India and Burma, often gregarious. In the N. W. Himalaya. In Travancore not common.

	SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
13.	Saptaparṇa .	...	*Alstonia scholaris*	Sub-himalayan tract, ascending to 3,000 feet from the Jumna eastwards. Western Peninsula and Burma, mostly in deciduous forests, Bengal, Assam, Andamans.
14.	Śamî		*Acacia suma*	W. Peninsula, both on the west as well as east side extending north to Pertabgarh, in S. Râjputana, Lower Bengal.
15.	Tunna		*Cedrela toona*	Sub-himalayan tract from the Indus eastwards. Evergreen forests of the W. Ghats and other hills of the W. Peninsula, Khasi Hills, Manipur, Upper and Lower Burma. Cultivated extensively.
16.	Devadâru	Himalayan cedar.	*Cedrus deodara*	Afghanistan, Chittral, Kurram, N. W. Himalaya. On two feeders of Alakananda. Cultivated in Kumaon and Nepal.
17.	Vikankata		*Flacourtia sapida*	Sub-himalayan tract from the Punjab eastwards, Rajputana, Behar, Central India, the Deccan, and the Peninsula, mostly in dry open places and on rocky hills, Manipur.
18.	Karamaṇḍa		*Carissa carandas*	Cultivated for its fruit in most parts of India.
19.	Ingudî		*Balanites roxburghii.*	Chiefly in the drier parts of India and Burma, as far north as Delhi, common in the open country, particularly on stiff clay soil.
20.	Bhûrja		*Betula bhojapatra*	Kurram valley, 10—11,000 feet, in Himalaya, 10—14,000 feet, in the Punjab as low as 7,800 feet also in the inner arid region. Often gregarious at the upper limit of tree vegetation. The outer bark is used as a paper for writing and packing, for umbrella covers and for the roofing of houses.

SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
21. Viṣamuṣthi		*Strychnos nux-vomica.*	Gorakhpur forests. Near Pundua, Orissa, W. Peninsula, Burma. The seeds contain strychnine, an extremely bitter and most poisonous alkaloid.
22 Karîraka ...		*Capparis aphylla*	Arid and dry regions of W. Peninsula, from the Punjab and Sind to Tuticorin, waste lands of the Doab.
23. Sallaki		*Boswellia serrata*	Sub-himalayan tract from the Sutlej eastwards and throughout the drier parts of the Western Peninsula. Always in deciduous forests and often gregarious, forming open forests, C. India, Behar, Chutia Nagpur.
24. Kâśmarî		*Gmelina arborea*	Sub-himalayan tract from the Chenab eastwards. Aravalli Hills, C. I., Singhbhum, Western Peninsula, Burma, Assam, Central Bengal, South Lusai Hills, Chittagong.
25. Pâthâ		*Stephania hernandifolia.*	Sub-himalayan tract from Nepal eastwards, Assam, Khasi Hills, Bengal, Burma, W. Ghats and Coast, Ceylon.
26. Tinduka		*Diospyros embryopteris.*	Sub-himalayan tract from the Jumna to the Tista, chiefly in ravines and moist shady places. C. I., W. Peninsula, common in Northern Circars, Bengal. The pulp of the unripe fruit is used as gum and in the place of tar for paving the seams of boat.
27. Vîjasâraka		Variety of *Citrus medica.*	
28. Harîtakî		*Terminalia chebula*	Sub-himalayan tract from the Sutlej eastwards. Common in the deciduous forests. The dry fruit is one of the best tanning materials. (See Brandis' *Indian Trees*, p. 308, Edition of 1906).
29. Bhallâta	Marking nut	*Semecarpus anacardium.*	Sub-himalayan tract from the Bias eastwards. Assam, Khasi Hills, Chittagong, C. I., W. Peninsula, Behar, Chutia Nagpur, Upper Burma.

SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
30. Sampâka.			
31. Arka ..	...	*Calotropis gigantea.*	Common in the plains of Northern India and in the Peninsula, Jabalpur, Sundariban, Singhbhum, often gregarious. Fibre silky, made into rope, paper and cloth.
32. Puṣkara.			
33. Arimeda	...	*Acacia farnesiana*	Throughout India and Burma.
34. Pîtadru	Variety of pine (Deodar).		
35. Śâlmalî	The cotton tree.	*Bombax malabaricum.*	Sub-himalayan tract from the Indus eastwards. Common in both peninsulas and often cultivated.
36. Vibhîtaka		*Terminalia bellerica.*	Sub-himalayan tract from near the Indus eastwards. Common throughout India and Burma, excepting the arid region of Sind, Western Rajputana and the Southern Punjab. Fruit used for dyeing and tanning.
37. Naravela.			
38. Madhuka		*Bassia latifolia*	Planted in most parts of India, propagating itself by selfsown seed. Indigenous in the Sub-himalayan tract from the Ravi to the Great Gandak, in the Satpura range, and the Peninsula.

The list of *Âraṇyaka* Flora in *Sukranîti* contains 38 plants. Of these, three have not been identified: (1) Sampâka, (2) Puṣkara and (3) Naravela. The remaining 35 plants belong to 34 species,[1] as one species has been mentioned in two varieties, *e.g.*, the *Pinus deodara* as Devadâru and Pîtadru.

These 34 species are grouped under the following 23 Natural Orders:

- I. Leguminosæ
  - (1) Acacia catechu.
  - (2) Crotalaria burhia.
  - (3) Butea frondosa.
  - (4) Acacia arabica.
  - (5) Acacia suma.
  - (6) Acacia farnesiana.
- II. Verbenaceæ
  - (1) Tectona grandis.
  - (2) Premna integrifolia.
  - (3) Gmelina arborea.

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[1] It is to be noted that *Vijasâraka* mentioned here is a variety of *Citrus medica* included in the Fruit-bearing list.

III.	Bignoniaceæ		Oroxylum indicum.
IV.	Guttiferæ		Garcinia xanthochymus.
V.	Dipterocarpaceæ		Shorea robusta.
VI.	Apocynaceæ	(1)	Holarrhena antidysenterica.
		(2)	Carissa carandas.
		(3)	Alstonia scholaris.
VII.	Combretaceæ	(1)	Anogeissus latifolia,
		(2)	Terminalia arjuna.
		(3)	Terminalia chebula.
		(4)	Terminalia bellerica.
VIII.	Meliaceæ		Cedrela toona.
IX.	Coniferæ		Cedrus Deodara.
X.	Bixaceæ		Flacourtia sapida.
XI.	Simarubaceæ		Balanites roxburghii.
XII.	Betulaceæ		Betula bhojapatra.
XIII.	Loganiaceæ		Strychnos nux vomica.
XIV.	Capparidaceæ		Capparis aphylla.
XV.	Burseraceæ		Boswellia serrata.
XVI.	Menispermaceæ		Stephania hernandifolia.
XVII.	Ebenaceæ		Diospyros embryopteris.
XVIII.	Rutaceæ		Citrus medica.
XIX.	Anacardiaceæ		Semecarpus anacardium.
XX.	Asclepiadaceæ		Calotropis gigantea.
XXI.	Malvaceæ		Bombax malabaricum.
XXII.	Sapotaceæ		Bassia latifolia.

(*c*) *Other Plants.*[1]

The following is the list of plants to which references have been made in *Sukranîti* either as illustrations or as economic products of daily domestic use, etc.:

	SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
1.	Utpala, Kamala.	Lotus	*Nelumbium speciosum.*	Large aquatic herb found all over India and extending as far north as Kashmir.
2.	Sarṣapa	Mustard	*Brassica campestris.*	Throughout India.
3.	Veṇu	Bamboo	*Dendrocalamus strictus.*	Widely spread and very common throughout India and Burma.
4.	Vrîhi	Rice	*Oryza sativa.*	Cultivated throughout India. Chief wild habitat from Madras and Orissa to Bengal, Chittagong, Assam. Extends to Nilgiri Hills, U. P., and even to Punjab.

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[1] See *Food-Grains of India* by A. H. Church (Chapman & Hall, London, 1886), *The Indian Empire* in the Imperial Gazetteer of India Series, Vol. III, Economic, Chapter II (1907). Watt's *Dictionary of Economic Products of India*, Vols. V, VI (*Parts I and II*).

SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
5. Ikṣu	Sugarcane	*Saccharum officinarum.*	U. P., Bengal, Punjab. Cultivated throughout sub-tropical and tropical Asia and the islands of the Indian and Pacific oceans.
6. Tâmbûla	Betel leaf	*Piper betle*	Cultivated for the sake of its leaves in the hotter and damper regions of India and Ceylon (Madras, C. P., Bengal, U. P., Bombay).
7. Kuluttha	Horse gram	*Dolichos biflorus* or *uniflorus.*	Wild in the Himalaya to Ceylon and Burma, ascending to 3,000 feet in Sikkim. Not infrequently cultivated.
8. Mâṣa	Black gram	*Phaseolus radiatus*	Both wild and cultivated throughout the plains.
9. Mudga	Green gram	*Phaseolus mungo*	Both wild and cultivated throughout the plains, ascending to 6,000 feet in the outer ranges of N. W. Himalaya.
10. Yava	Barley	*Hordeum vulgare*	Throughout India.
11. Tila	Sesamum	*Sesamum indicum*	Cultivated throughout the tropical regions of the globe. In India a crop of the warm temperate or sub-tropical tracts.
12. Niṣpâpa		*Dolichos sinensis* or *lablab.*	Wild and cultivated throughout India.
13. Makuṣtha		*Phaseolus aconitifolius.*	Throughout India from Himalaya to Ceylon and extending from the tropical region up to 4,000 feet in the N. W.
14. Chaṇaka	Gram	*Cicer arietinum*	Extensively cultivated throughout India, especially in the Northern Provinces.
15. Masûra	Lentil	*Ervum lens* or *Lens esculenta.*	Winter crop all over India.
16. Snuhi		*Euphorbia neriifolia*	Wild on rocky ground in C. I., and extensively cultivated in the neighbourhood of villages in Bengal and elsewhere.
17. Rasona	Garlic	*Allium sativum*	Cultivated all over India.
18. Nilî	Indigo	*Indigofera tinctoria.*	Cultivated as an annual or as a biennial or triennial.
19. Tula (Bengali name for Kârpâsa),	Cotton	*Gossypium herbaceum.*	Egypt, Asia Minor, Northern Africa and Southern Europe. Cultivated at least in N. W. India even as early as Alexander. (*Watt's Dictionary.*)

	SANSKRIT NAME.	ENGLISH NAME.	BOTANICAL NAME.	HABITAT.
20.	Godhuma ...	Wheat. ..	*Triticum vulgare* or *sativum.*	Generally, in those parts of India, where rice does not thrive; but rarely it is cultivated anywhere south of the Deccan.
21.	Harimatha	Peas	*Pisum sativum*	Perhaps existed in Northern India before the arrival of E. Aryans. Universal.
22.	Śwetasarśapa,	White mustard or Rye.	*Brassica alba*	Supposed to be a native of more southern portion of Europe and Western Asia. By no means a common plant.
23.	Gunja, Rati, Kriṣṇala.		*Abrus precatorius*	All along the Himalaya ascending to altitude 3,000 feet and spreading through the plains of India to Ceylon and Siam.
24.	Gânjâ	Indian hemp...	*Cannabis sativa*	Wild on the Western Himalaya and Kashmir and acclimatised on the plains of India generally

The list consisting mainly of pulses and cereals contains 24 plants belonging to 24 species. The absence of millets and some other cereals is to be noted, but does not prove anything; for the presence of barley in the list indicates the conditions necessary for the growth of all these. The 24 species fall under the following nine Natural Orders :—

Leguminosa	(1)	Dolichos biflorus.
	(2)	Phaseolus radiatus.
	(3)	Phaseolus mungo.
	(4)	Dolichos lablab.
	(5)	Phaseolus acontifolius.
	(6)	Cicer arietinum.
	(7)	Lens esculenta.
	(8)	Indigofera tinctoria.
	(9)	Abrus precatorius.
	(10)	Pisum sativum.
II. Gramineæ	(1)	Hordeum vulgare.
	(2)	Dendrocalamus strictus.
	(3)	Oryza sativa.
	(4)	Saccharum officinarum.
	(5)	*Triticum sativum or vulgare.*
III. Cruciferæ ..	(1)	Brassica campestris.
	(2)	Brassica alba.
IV. Nymphaceæ ..	...	Nelumbium speciosum.
V. Euphorbiaceæ.	...	Euphorbia neriifolia.
VI. Liliaceæ .	...	Allium sativum.
VII. Piperaceæ .	...	Piper betle.
VIII. Pedalineæ	...	Sesamum indicum.
IX. Urticaceæ	...	Cannabis sativa.

SECTION 3.

The Locale of Sukraniti.

1. '*Botanical Statistics*' *applied to Sukraniti.*

The Sukra Flora consists of a little above 100 plants, of which seven have not been identified. Taking into consideration the varieties, the total number of species in *Sukraniti* is 93 under 40 Natural Orders. Only three of these orders belong to the Monocotyledon class, *e.g.*, Liliaceæ, Palmæ and Gramineæ.

In numerical importance the dominant Orders of Sukra Flora are given below :—

1.	Leguminosæ	18 species.	9.	Palmaceæ	3 species
2.	Urticaceæ	5 ,,	10.	Sapotaceæ	3 ,,
3.	Rutaceæ	4 ,,	11.	Euphorbiaceæ	2 ,,
4.	Gramineæ	4 ,,	12.	Coniferæ	2 ,,
5.	Combretaceæ	4 ,,	13.	Lythraceæ	2 ,,
6.	Verbenaceæ	3 ,,	14.	Guttiferæ	2 ,,
7.	Apocynaceæ	3 ,,	15.	Ebenaceæ	2 ,,
8.	Anacardiaceæ	3 ,,			

The habitats or 'station' of the plants given in the tables in the preceding section indicate a wide range both horizontally and vertically. The 'regions' and 'zones' of the Sukra Flora are thus varied like those of the whole of Indian vegetation. Himalayan, Sub-himalayan, alluvial, riparian, deciduous, evergreen, arid, rocky, and littoral (seacoast), in fact, all the descriptions of Indian Flora have their specimens in Sukranīti. Their vertical distribution also ranges from sea-level to about 3,000 feet high and more. The Sukra Flora thus tells the story of the diverse meteorological, physiographical and geological features of the Indian continent, and may be regarded as more or less epitomical of Flora Indica.

Many of these plants are cosmopolites, distributed, whether as indigenous or naturalised, throughout the country. Except the Pinus longifolia (sarala) which is characteristic of Himalayan Flora, the Santalum album which is characteristic of South India, and the Palmæ of the hot and humid regions, the Sukra Flora does not seem to contain any characteristically local or provincial specimens. If we add to these the fact that as articles of commerce for the necessaries, medicines, arts, industries, comforts and luxuries of life most Indian plants have been known in all parts of India since very early times,[1] we can realise the difficulty of characterising the Sukra Flora as belonging to a particular area on the strength of the 'statistics' and 'physiognomics' of plants, and thus of ascertaining the 'locale' of *Sukraniti* from a study of the geography of its flora.

The small percentage of Monocotyledons in proportion to the Dicotyledons indicates lower latitude and absence of great cold. This is according to the reckonings of Humboldt[1] who determined after laborious processes that "in the torrid zone the monocotyledons are as 1 : 6 to the Dicotyledons, while in the temperate zone the proportion is 1 : 4, and in the arctic 1 : 3." This delimitation of area, however, is too wide, as it gives only one general term 'equatorial' for the distribution of the Sukra Flora.

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[1] The *Charaka Saṃhita*, a medicinal work of the Pre-Buddhistic times, written certainly in the Punjab, mentions Santalum album. Roxburgh in *Flora Indica* (1874) notes the luxuriant growth of the plant in Calcutta Botanical Gardens (p. 148).

From the statistics of the species and Natural Orders, however, we can generalise, though still within wide limits, as to the Geography of the Sukra Flora more satisfactorily than above. For most of the species in the Sukra Flora may be allotted to the sub-tropical zone, the botanical characteristics of which are given below :[2] "In the sub-tropical zone the vegetation is green throughout all the year like the forests of the damp regions of the torrid zone. From the great heat of the sun palms as well as bananas grow here in the plains. * * * The date-palm belongs to the whole western part of the sub-tropical zone of the old world. * * * In summer* there is a tropical heat which ripens almost all the fruits of the equatorial zone, while in winter the temperature is so low that often old trees of the well-known noble tropical fruits perish. During the summer which is here at the rainy season there are cultivated rice, indigo, cotton tree, &c.; of leguminosæ, species of phaseolus and dolichos ; gourds, sesamum, &c.

But the appearance of the inhabited districts of this country is totally different in winter when the cereals of the north are cultivated such as wheat, barley, oats, millet, and also beans, mustards, &c. But the vegetation of the uncultivated places as well as of the cultivated soil exhibits these different characters at the different seasons; that is, in summer it resembles the vegetation of the warmer zones. In winter, on the contrary, only old well-known genera belonging to the colder part of the temperate zone appear. * * * The chief plants which in summer adorn the district round Delhi with a more southern character, are Dalbergia sissoo, Acacia serissa, arabica, farnesiana, Cedrela toona and various species of Melia, Ficus, Morus, Gmelina, Phœnix, &c."

This diversity of vegetation according to seasons of the year would well explain the wide differences in the habitation of the plants in Sukranîti we have referred to at the beginning. The following general description of the physiognomy and topography of the countries of the sub-tropical zone, also, fits in very well with the varied physiography suggested by the Sukra Flora :—"In all the plants we have named we perceive a receding from the equator ; there is no longer a trace of the excess of tropical forms ; but so beautiful a country, the climate of which unites the advantages of the torrid and temperate zones, will in the possession of an active nation, soon become the rendezvous of all the cultivated plants of the various zones, and even now there is grown there a variety of the beautiful fruits of the torrid and temperate zones, such as hardly any country can boast of."

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[1] Meyen's *Botanical Geography* (1846), pp. 278-79.

[2] Meyen's *Botanical Geography* (1846). pp. 177 etc. The country round Delhi and from Delhi to Serampore on the Hooghly has been taken as typical of the sub-tropical zone.

Thus gradually narrowing the boundaries we come to the conclusion that the Flora of the sub-tropical zone may well cover the whole of Sukra Flora. We have to note also that the chief characteristic of this zone, as of the Sukra Flora, is the double aspect according as the summer or winter vegetation is most fully displayed.

In order to find out more closely the locale of this vegetation in India it now remains to apply or interpret the above hypothetical generalisation about Sukra Flora according to the facts and conditions of Indian Phyto-geography. We therefore proceed to enquire into the regions and sub-regions of India, botanically considered, according to (1) ecological evidences and (2) literary evidences. We shall then be in a position to demonstrate (1) how far the sub-tropical theory is tenable and (2) which portions of this zone are indicated.

For the ecological evidences we should have to take a broad survey of Indian Botanical Geography and study the chief provinces or divisions into which the country may be divided according to the predominent types of vegetation brought on by the conditions of soil, physical features, environment and climate, &c. In the second place, the Sukra Flora would have to be allocated in one or other of these botanical provinces. The hypothesis about the sub-tropical character of the Sukra Flora would thus be incidentally verified.

For literary evidences we require a historic survey of Indian literature. The objects are :—(1) to trace the influence of topographical and botanical conditions on the literary activities of ancient and mediäeval scholars, *e.g.*, to detect any clues as to the local character of the botanical references by Indian authors, and (2) to compare, contrast or connect the Sukra Flora, if possible, with the important Floras celebrated in Indian literary history, *e.g.*, Vedic, Pâṇinian, Charakan, Buddhistic, Kâlidâsic, Amarasimhan, Varâhamihiran, Tantric, Paurâṇic, and so on, as regards geographical affinity or otherwise.

2. *Ecological Evidences.*

In the following summary of the characteristics of Indian Botanical Geography we are giving a synopsis of the classical remarks of Dr. Hooker and Dr. Thomson in the celebrated *Introductory Essay* to their monumental *Flora Indica.* "From the position of India, its climate (and hence its vegetation) is more generally tropical, than the latitude under which so much of it is included would alone indicate. The mountains, however, when above 4—5,000 feet everywhere present more or less of a temperate vegetation which becomes wholly temperate at greater elevations and which passes into an alpine flora over a large extent of still loftier mountain country."

The tropical character is thus the most general feature of Indian vegetation. "The general physiognomy of the greater part of the Indian Flora probably approximates more to that of tropical Africa than to any other part of the globe, accompanying in both cases immense alluvial plains, bounded by deserts at certain points and traversed by mountian chains of moderate elevation."

The vegetation, however, does not present a dead uniformity, but is richly diversified in aspect. Thus

(1) the impenetrable green jungles of Eastern Bengal, and the west coast of the Madras Peninsula contrast strongly with the drier parts of the inter-tropical zone, and still more so with the loosely-timbered districts of Central India and of the base of the Western Himalaya.

(2) The tropical forests may be divided into (*a*) those which inhabit perennially humid districts and (*b*) those which are confined to regions presenting contrasted seasons of summer rain and winter drought.

(3) The third circumstance which contributes to diversity in Indian Flora is the peculiar protean climate of the extra-tropical regions. These unite within themselves by a change of seasons the conditions of both tropical and more or less temperate floras. This holds true not only with regard to forest vegetation, but also with regard to annuals and perennially rooted plants with annual stems. The intrusion of tropical floras upon extra-tropical regions and loftier mountain valleys in summer, and the appearance of annual plants of the north temperate zone in the extra-tropical regions during the cold months are causes which greatly modify the vegetation of India in general aspects and character.

Now, taking the more fundamental climatological forces into view, the whole of India may be regarded as constituting only one Botanical area, sub-divided for ordinary (and less scientific) purposes into tropical and sub-tropical. This is practically what Hooker and Thomson did in the *Introductory Essay* in 1855 ; in which, to quote from Brandis' *Indian Trees*, [1] "four primary divisions were recognised, *viz.* i. Hindustan including the Western Peninsula from the base of the Himalaya to Cape Comorin ; ii. The Himalaya ; iii. Eastern India or India east of the mouth of the Ganges ; and iv. Afghanistan and Baluchistan."

The same thing has been done, though under slightly different names, by Hooker in the chapter on Indian Botany in Vol. I of the *Indian Empire* of the Imperial Gazetteer Series (1906). To quote Brandis, again, "In this admirable paper Hooker divides British India primarily into three Botanical areas, a Himalayan, an eastern and a western, the two last-named being roughly separated by a line drawn meridionally from the Himalaya to the Bay of Bengal. These areas he divides into nine provinces, *viz.*, (1) The Eastern Himalaya, (2) The Western Himalaya, (3) The Indus plain, (4) The Gangetic plain, (5) Malabar in a very broad sense, (6) The Deccan in a very extended sense, (7) Ceylon, (8) Burma and (9) Malaya Peninsula."

It is in one or other of these Botanical provinces that we have to seek the types represented by the Sukra Flora.

The chief difficulty arises from the fact that, though "each one of these is distinguished from the others by the possession of some characteristic forms of vegetation and more especially by the general aspect and constitution of its flora, it must not be assumed [1] that all the species of a botanical province are to be found nowhere outside its geographical limits. On the contrary, the characteristic vegetation of one province passes by insensible gradations into that of another, so that, owing to the absence of any sharply defined limits, their boundaries cannot be considered as more than approximative."

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[1] Pp. XV. xvi (Edition of 1906).

(*A*) *Gujrât Flora and Sukra Flora.*

If individual species or orders are considered, the Sukra Flora may be more or less wholly located within parts of almost each one of these provinces.

Thus in the list of Gujrat Trees compiled in Vol. XXV of *Gazetteer of the Bombay Presidency* (1886), we get the following specimens of the Sukra Flora :

(*a*) *Fruit Trees.*

1. Mangifera indica. 2. Bassia latifolia. 3. Tamarindus indica. 4. Zizyphus jujuba. 5. Feronia elephantum. 6. Ægle marmelos. 7. Carissa carandas. 8. Diospyros melanxylon. 9. Citrus medica. 10. Punica granatum. 11. Morus indica. 12. Anona reticulata. 13. Cocos nucifera. 14. Areca catechu. 15. Musa sapientum.

(*b*) *Flowers and Flowering Trees.*

1. Michelia champaka. 2. Bombax malabaricum.

(*c*) *Timber Trees.*

1. Tectona grandis. 2. Dalbergia sissoo, 3. Gmelina arborea. 4. Acacia arabica. 5. Anogeissus latifolia.

(*d*) *Aroma and spice-producing Trees.*

1. Santalum album. 2. Boswellia serrata.

(*e*) *Dye pigment and Tan-yielding Trees.*

1. Butea frondosa. 2. Acacia catechu. 3. Terminalia bellerica. 4. Woodfordia floribunda.

(*f*) *Other useful Trees.*

1. Holarrhena antidysenterica. 2. Dendrocalamus strictus.

(*g*) *Liquor yielding Trees.*

1. Phœnix sylvestris

(*h*) *Shade Trees.*

1. Terminalia arjuna. 2. Ficus glomerata. 3. Ficus religiosa. 4. Ficus bengalensis. 5. Pongamia glabra. 6. Azadirachta indica.

(*i*) *Miscellaneous Trees.*

1. Balanites roxburghii.

(*j*) *Hedge Plants.*

1. Euphorbia neriifolia.

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[1] Remarks about the Flora of the Bombay Presidency (divided into five Botanical Provinces) by Dr. W. Gray.

In the above list we have altogether 39 species, out of 93 in the Sukra Flora. As the Gujrat list does not contain the cereals, pulses and other food-grains we have to deduct at least 24 from the Sukra list for purposes of comparison. The result is that above half of Sukra Flora is represented in Gujrat, an area which, according to the Botanical divisions of Hooker, falls within two provinces, the Indus plain and Malabar.[1]

(*B*) *Bengal* (*Gangetic Plain*) *Flora and Sukra Flora.*

Exactly the same may be said with greater force about the plants of Bengal, also, which forms the humid region of the Gangetic delta and the region immediately north of it, constituting the southern sub-region of Hooker's Botanical province of the Gangetic plain. "The villages[2] are usually buried in groves of mango, figs, and bamboos, with the betel-nut, palm, palmyra, phœnix and cocoa-nut." "The indigenous flora is much more extensive than that of the upper Gangetic plain, comprising[3] all the species which grow there (except those belonging to the Egyptian or arid flora), besides many others which are not found to the north-west."

Now this inclusion of Upper Gangetic Flora within the area of Bengal means practically the inclusion of all the characteristic floras of India. For, according to the *Introductory Essay*, "If we exclude this dry country flora, which just skirts the southern part of the plain, the vegetation of the Gangetic plain presents few peculiar features; indeed a catalogue of the plants of Rohilkhand contains very few species which are not common all over India, even to the extreme south of the peninsula, in those provinces which have a similar climate. * * * We have already had occasion to direct attention to the remarkable uniformity of the vegetation over large areas of India, and as our information becomes more precise, the sameness becomes more striking."

These circumstances lead to Bengal Flora being more copious, varied and epitomic of India, comprising (1) not only the characteristic vegetation of humid regions like portions of Gujrat, but also (2) the species that are more or less uniformly distributed over the whole of India, excepting only the peculiar vegetation of arid regions. The result is that Bengal alone can supply a greater percentage of the Sukra Flora than Gujrat or other areas having more or less the climate of Bengal type.

And if following Botanical Geographers, we take Bengal proper along with the other sub-regions of the Gangetic provinces as one Botanical Region, the whole of the Sukra Flora including, as it does, the deciduous, evergreen, riparian, arid, littoral, humid and other species can be without the least difficulty located in this habitat, which has an extensive area, slightly diverse geological character and the characteristic round of seasons. For this Gangetic plain[1] comprises (1) an upper region including Rajputana east of the Aravalli Hills, Bundelkhand, and Malwa north of the Vindhya range and (2) a lower, including Bengal south of the Himalayas, Orissa north of the Mahanadi, the Assam, Sylhet, Cachar, and Tippera plains.

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[1] See Imperial Gazetteer, *Indian Empire*, Vol. I. p. 163.

[2] *Indian Empire* in the Imperial Gazetteer of India. Vol. I, 183.

[3] *Introductory Essay to Flora Indica* by Hooker and Thomson, p. 165; see also *Records of the Botanical Survey of India*, Vol. III, No. 2. "The Vegetation of the districts of Hughli, Howrah and 24-Pergunnahs" by D. Prain (1905). It is interesting to learn that, of the 69 species in the two lists of Sukra Flora, 44 are to be found in these two districts of Bengal alone. Cf. the lists of plants in the introductory section on Topography and Vegetation (pp. 149-168). As for the cereals and other plants, the whole Sukra Flora is represented in this small enough area.

(C) *South Indian Flora and Sukra Flora.*

About the vegetation of Southern India we summarise below the remarks of Hooker and Thomson in the *Introductory Essay*: "From the humid character of the Malabar climate, its luxuriant vegetation might be inferred. Hamilton tells us that it resembles Bengal in verdure, but has loftier trees and more palms : the shores are skirted with cocoanuts, and the villages surrounded with groves of betel-nut, palms, &c. * * * The low valleys are richly clothed with rice-fields and the hill sides with millets and other dry crops, whilst the gorges and slopes of the loftier mountains are covered with a dense and luxuriant forest. The mass of the flora is Malayan, and identical with that of Ceylon, and many of the species are further common to the Khasia and the base of the Himalaya.* * * The whole Concan is more open than Malabar, heavy forests are rarer, many tropical Malayan forms disappear.* * * The arid flora of the Deccan, of Marwar and Sind, however, hardly enters the Deccan.* * * As a whole the vegetation of Carnatic is neither rich nor varied. The climate being very arid except during the north-east monsoon, the humid flora is entirely absent.* * * The climate of Mysore is much drier than that of Malabar.* * * The vegetation of Mysore, like that of the Carnatic, is rather scanty. The level surface of the tableland is frequently very barren, and the hills are often bare or covered with low scrubby jungle.* * The vegetation of the plain of the Deccan is not very different from that of Mysore. The flora is not extensive, the great drought of the hot season being unfavourable to vegetation."

We have here the botanical features of two of the nine provinces enumerated above comprising about the whole of South India :[2]

(1) Malabar in a very extended sense—the humid belt of hilly or mountainous country extending along the western side of the peninsula from Southern Gujrat to Cape Comorin; and (2) the Deccan in a very broad sense; *i.e.*, the whole comparatively dry tableland of the peninsula east ot Malabar and South of the Gangetic and Indus plains together with the Coromandel Coast.

As might be expected, such an extensive area with so diverse botanical features as to constitute two great provinces would be able to make a decent show of the specimens included in the Sukra Flora. As a matter of fact, a comparison of the Sukra list with the lists for these two provinces in the Botanical volume of the *Bombay Gazetteer* as well as the chapter on Botany in the *Imperial Gazetteer*, would show that almost all of the Sukra Flora have their homes in this whole region taken together. And yet the total strength of the South Indian Flora, even supposing that so varied characteristics can be given to any one type, does not probably come up to that of Bengal (singly considered), and not certainly to the whole Gangetic plain (including Bengal) described above as a really single Botanical area.

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[1] Chapter IV, Botany in *Indian Empire*. Vol. I.

[2] *Indian Empire* in Imperial Gazetteer, Vol. I, p. 163.

So far as the Sukra Flora is concerned, the following specimens seem to be rare in the South :

(1) Feronia elephantum (wood apple).
(2) Mimusops hexandra (râjadana).
(3) Pyrus communis (pear tree, amrita).
(4) Pinus longifolia (sarala, pine).
(5) Juglans regia (akṣota, walnut).
(6) Phylanthus distichas.
(7) Myrica sapida (kâsthâmra).
(8) Diospyros melanxylon (kuddâla, ebony).
(9) Premna integrifolia (agnimantha).
(10) Cedrus or Pinus deodara (devadâru, Himalayan cedar).
(11) Flacourtia sapida (vikankata).
(12) Betula bhojpatra (bhurja)
(13) Boswellia serrata (sallaki).
(14) Stephenia hernandifolia (pâthâ).
(15) Diospyros embryopteris (tînduka).

In the above list of 15 species, the (1), (2), (6), (11), (14) and (15) are not entirely absent from South India. The other nine are conspicuous by their absence. The two Pines, longifolia and deodara, Juglans regia, Pyrus communis, and the Betula bhojapatra are essentially Himalayan, and hence belong to the North Indian type. The remaining four are mainly Sub-himalayan and have their habitats generally in the dry deciduous forests of North India.

(*D*) *Indus Plain Flora and Sukra Flora.*

The absence of the characteristic Himalayan and North Indian species in the southern regions or sub-regions, taken separately or together, is a strong proof against the Sukra Flora being of the southern type. Similarly, we have to exclude the Indus plain, a Botanical province of North India, also from claiming the locale of the Sukra Flora. For though the area is wide enough including the Punjab, Sind and Rajputana west of the Aravalli range and Jumna river, Cutch and Northern Gujrat, and repeats the vegetation of the

Sunderbans at the Indus delta, the flora is less copious and richly diversified and presents essentially the features of arid, deciduous and desert vegetation. The result is, that some of the more important specimens in Sukra Flora which are to be found in humid Gujrat and Bengal are entirely absent from this province.

The determination of the geographical limits of the Sukra Flora, positive and negative, has been guided by both meteorological and botanical considerations. We have had to find out some one province from among the large Botanical Provinces of India, which satisfies both the following double sets of conditions :

(1) A meteorological area which possesses both humid and arid characteristics, and

(2) a botanical area which can command both Himalayan and plain floras.

The first condition can be fulfilled by either the northern or southern region. For, meteorologically[1] speaking, there are two moist regions in India : (1) the western moist region extending from the Gulf of Cambay, and (2) the eastern moist region comprising the Eastern Himalaya with a narrow strip along the outer ranges extending north-west as far as the Ravi &c. Any one of these moist regions together with a neighbouring dry and ārid region, *e.g.*, the Peninsular (Deccan), and the area including Eastern Rajputana, a large part of United Provinces up to Cawnpur, &c., can well be the home of the Sukra Flora.

But the second test cannot be fulfilled except by a northern region, as we have seen above.

Hence, by a process of elimination, we get the northern (as well as eastern) moist region together with a neighbouring arid region, *e.g.*, Eastern Rajputana as the natural habitat of the Sukra Flora. The Indus Plain among the nine Botanical Provinces of Hooker is thus excluded as a matter of course ; the remaining portion of Northern India covering exactly the whole of the Gangetic plain, with its upper dry and lower humid regions described above, is the home of the Sukra Flora.

It may be remarked here that this Botanical Province corresponds also to the sub-tropical zone (23°—34° latitude) determined independently by the application of 'Botanical Statistics' to the Sukra Flora.

3. *Literary Evidences.*

The consideration of literary evidences would necessarily lead to a historic treatment of the knowledge of Flora displayed by the makers of Indian literature. Such a study is expected to yield not only a Botanical Geography of India defining within approximate limits the locale of the authors and their compositions, but also a Botanical History of the country giving the approximate periods during which certain plants began to be cultivated and naturalised in different parts of India, whether as imports from province to province or as exotics[1] from altogether alien soils. A history of Indian Botany like that of Indian Mineralogy is thus likely to solve some important questions of Indian Chronology, as they are really parts of the larger history—that of Indian economic as well as political life and institutions.

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[1] For these meteorological divisions, see Brandis' Introduction to his *Indian Trees*, p.

But, unfortunately, the landmarks of Indian literature, Vedic, Epic, Paurânik, Tantric, Buddhistic, &c., have not undergone that analytical study which may enable one to form an estimate of the progress of the Indians in the knowledge of plants and plant-life. Nor have even individual authors like Pâṇini, Charaka, Vâlmiki, Kâlidâsa, and others been so thoroughly and searchingly studied. The present attempt is, therefore, purely suggestive or tentative, and not at all exhaustive in any sense.

There are, however, two things which should be specially borne in mind in any study of literary evidences:

(1) we have to be perpetually on our guard against the fallacy of *argumentum ex silentio*; and

(2) we have to discriminate between what is purely a conventional mention or a reference to the permanent stock-in-trade preserved in floating literature which does not admit of any anachronisms and limitations of space, and what is the actual description of the sights and sounds or facts and phenomena in the locality or the region of experiences familiar to the author.

The errors arising from a neglect of these two conditions cannot, however, be easily avoided in the present state of our knowledge regarding things Indian, both physical and human.

A.—Vedic Flora and Sukra Flora.

The *Atharva Veda* is famous for its references to, and hymns about, plants. The usefulness of Flora is known by the reciters of the hymns in the following respects, *e.g.*, against injury and disease and obstruction of urine (I, 2, 3), against leprosy (I, 23), as a love-spell (I, 34), against curses and cursers (II, 7), for victory in disputation (II, 27), against a rival wife (III, 18), for recovery of virility (IV, 4), to heal serious wounds (IV, 12), against witchcraft, and to discover sorcerers (IV, 18, 20 and V, 14, 15), against various evils, enemies and super-human foes (IV, 17, 19, 37), against fever (V, 4), to win and fix a man's love (VII, 38) against a (woman) rival (VII, 113), etc.

The following extracts give a few specimens of the floral lore in the *Atharva Veda*:—

"The berry (pippali)[2] remedy for what is bruised, and remedy for what is pierced—that did the gods prepare; that is sufficient for life."

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[1] For an account of some of these importations from Central Asia, Africa, China, Malaya, America, &c., see Prain's *Vegetation of the Districts of Hughli-Howrah and 24 Pergunnahs* (1905) in the Records of the Botanical Survey of India, pp. 162-166.

[2] Harvard Oriental Series, Vol. 7, p. 359.

"Since thou, O off-wiper (apâmârga),[1] hast grown with reverted fruit, mayest thou repel from me all curses very far from here."

The amulet of *udumvara*[2] bestows various blessings :—

"Rich in manure, rich in fruit, *swadhâ* and cheer in our house—prosperity let Dhâtar assign to me through the keenness of the amulet of Udumvara. * * I have seized all the prosperity of cattle, of quadrupeds, of bipeds, and what grain (there is) ; the milk of cattle, the sap of herbs, may Brihaspati, may Savitar confirm to me. * * * As in the beginning, Thou, O forest-tree wast born together with prosperity, so let Saraswati assign to me fatness of riches.[3]"

The *darbhâ* plant is thus described :—

"Hundred-jointed, hard to be stirred, thousand-leaved, uplifting(?)—the darbhâ that is a formidable herb, that I bind on thee in order to (prolong) life-time. * * * In the sky is thy tuft, O herb ; in the earth art thou set ; with thee that hast a thousand joints, do we increase further our life-time."

The efficacy of the following herbs also is most eloquently dwelt upon—*jangida* (XIX, 34, 35), *satavâra* (XIX, 36), *guggulu* (XIX, 38), *kuṣṭha* (XIX, 39).

The *aśwattha* is invoked against enemies (III, 6) and the *śami* for benefit to the hair (VI. 30). The land is known to be the mother of healing plants :[4] "These three earths (*prithivi*) that are there—of them earth (*bhûmi*) is the highest ; from off their skin have I seized a remedy."

The following is the hymn sung by Viswâmitra for the increase of barley:[5]

"1. Rise up, become abundant with thine own greatness, O barley ; ruin all receptacles ; let not the bolt from heaven smite thee.

2. Where we appeal unto thee, the divine barley that listens, there rise up, like the sky ; be unexhausted, like the ocean.

3. Unexhausted be thine attendants, unexhausted thy heaps ; thy bestowers be unexhausted ; thy eaters be unexhaused."

The following plants are common to *Sukraniti* and *Vedic Literature* :[6] Ficus religiosa, (2) Ficus glomerata, (3) Zizyphus jujuba, (4) Gmelina arborea, (5) Butea frondosa, (6) Acacia catechu, (7) Phœnix sylvestris, (8) Pinus deodara (9) Ægle marmelos, (10) Flacourtia sapida, (11) Acacia suma, (12) Bombax malabaricum, (13) Dalbergia sissoo, (14) Diospyros embryopteris (15) Ficus bengalensis.

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[1] *Ibid*, Vol. 7, p. 432.

[2] *Atharva Veda* (Harvard, Vol. 8), pp. 944-46.

[3] *Ibid*, pp. 947-950.

[4] Harvard Oriental Series, Vol. 8, p. 295.

[5] *Ibid*, Vol. 8, p. 387.

[6] For references to plants in Vedic Literature, see *Vedic Index*, Vol. II, p.590. See also Macdonell's *Sanskrit Literature* (1900), pp. 145-146, and Mr. Bijaychandra Majumdar's *Vedic Names of Plants* in the Kârtik number of the Bengali monthly, *Bhârati* (Calcutta, 1913.)

Of these some are Himalayan species, some are common all-India cosmopolites, and others belong to the more or less dry and arid regions. The Vedic Flora thus indicates the marks of the Indus plain region and the upper Gangetic plain. So far as Sukra Flora partially coincides with Vedic Flora, the common geographical influences must be responsible for this. We have seen above that this area is a part of the larger region covered by the Sukra Flora.

(*B*) *Charaka Flora and Sukra Flora.*

Among the fruit-bearing plants, the following species are common to *Charaka Saṃhitâ*[1] and *Sukranîti*: (1) Ficus glomerata, (2) Tamarindus indica, (3) Santalum album, (4) Citrus medica, (5) Nauclea cadamba, (6) Jonesia asoka, (7) Ægle marmelos, (8) Feronia elephantum, (9) Mimusops hexandra, (10) Mangifera indica, (11) Calophyllum inophyllum, (12) Michelia champaka, (13) Phœnix sylvestris, (14) Pinus longifolia, (15) Punica granatum, (16) Juglans regia, (17) Zizyphus jujuba, (18) Azadirachta indica, (19) Myrica sapida, (20) Mimusops hexandra, (21) Pongamia glabra, (22) Areca catechu.

Among the *âraṇyaka*, the following species are common to *Charaka Saṃhitâ* and *Sukranîti*: (1) Acacia catechu, (2) Premna integrifolia, (3) Shorea robusta, (4) Holarrhena antidysenterica, (5) Anogeissus latifolia, (6) Butea frondosa, (7) Alstonia scholaris, (8) Cedrela toona, (9) Cedrus deodara, (10) Carissa carandas, (11) Balanites roxburghii, (12) Boswellia serrata, (13) Gmelina arborea, (14) Stephania hernandifolia, (15) Diospyros embryopteris, (16) Terminalia chebula, (17) Semecarpus anacardium, (18) Calotropis gigantea, (19) Acacia farnesiana, (20) Bombax malabaricum, (21) Terminalia cellerica and (22) Bassia latifolia.

In the above two lists we have 44 species of the 69 in the Sukra Flora, *i.e.*, above 60 per cent. A careful enumeration of all plants in *Charaka* would show a higher percentage. In fact, it would not at all be erroneous if we assert that perhaps the whole of the Sukra Flora is included in the Charaka list of 500 plants divided into 50 pharmacopoeial *vargas* or orders of 10 each. It is not safe to define the geographical horizon of the Charaka Flora, at any rate it is certain that, unlike the Vedic Flora, it cannot be assigned solely to the Indus or the Upper Gangetic plain. *Cocos nucifera* does not seem to be included in the list, but *Areca catechu* is there, and this unmistakably points to humid, deltaic or littoral vegetation.

This extension of the Charaka Flora beyond the limits of the Punjab, the home of the first authors of the Charaka cycle, indicates that the whole of Northern India at any rate, if not portions of the South, must have been known from sea to sea. Regular trade in medicinal herbs, cultivation or naturalisation of those that are not indigenous, systematic exploration of forests on hills and in plains, and such like things that take Ayurvedists and druggists out of the limits of any one botanical region and make them more or less cosmopolitan, are implied in the scientific analysis and classification of the vegetable materia medica in the text-book of the Punjab masters.

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[1] For the names of plants in *Charaka Saṃhita*, see the Marathi work on the *Vegetable Flora of India* by Dr. Pandurang Gopal (Poona, 1880).

It must be noted also that the possibility of merely hearsay or conventional references and descriptions of things not personally observed or experimented upon is not unlikely, though it would be well-nigh impossible to assert this dogmatically about one or other of the Charakans, Susrutans, Vâgbhatans, and Chakradattans. Certain it is that in the latter-day schools of medicine the lists became more and more conventional, mere reproductions from the writings of the great masters or Riṣis. There is, however, another important point with regard to the lists of Flora in the successive commentaries or abridgments of the medical encyclopædias. A comparative study[1] of the Indian Pharmacopæias would show that Vâgbhata, Chakradatta. Narahari Pandit and Bhâva Misra, while perpetuating the tradition of their great precursors, have introduced not only new names but also new plants in the treatises prepared respectively for Western India, Eastern India, Mahârâṣtra and Madhyadesa. While therefore, we admit the existence of a conventional floating literature on medicinal plants as on other things, which, like a touch of nature converted the whole of India into a single unit, a common home of the men of letters, and imparted a family likeness and universal or all-India character to the literary productions of educated Hindusthan, we cannot rationally ignore in them the possession, also, of a local colour and provincial physiognomy which can be detected only by the patiently investigating eye of skilful observers.

So far as the Sukra Flora is concerned, we see that its geography is more extensive than that of the Vedic, but less than or perhaps equal to, that of the Charaka. If we notice the flora in points which make them differ, we find that the Vedic and the Charaka are more Himalayan, while the Sukra is more humid.

(*C*) *Varâha Flora and Sukra Flora.*

In the *Brihat Saṃhitâ* of Varâhamihira, botanical facts and phenomena have been recorded in three chapters. The 29th chapter deals with flowers and plants and is called *Kusumalatâdhyâya.* The 54th is called *Dagârgala* and deals with under-currents, both good and evil, which may be indicated by the position and growth of plants as well as by other things. The 55th chapter treats of gardening and horticulture and is named *Brikṣâyurveda.* The plants mentioned in these three chapters may be taken to be those most familiar to the people of Avanti (in Ujjayini) in the 6th century A.D., for that is the birth-place of Varâha. It may be possible to find out the Geography of the Sukra Flora by comparing the lists furnished in *Brihat Saṃhitâ* about the Ujjayini Flora with those in *Sukranîti.*

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[1] Materials for such a comparative study have been furnished by Kavirâj Birajâcharan Gupta of Coochbehar State in the two volumes of the Bengali work, *Vanauṣadhidarpaṇa*, and also in his learned introduction to them.

Among the trees mentioned by the Sukra authors as *phalinah* or fruit-bearing, almost all are referred to by Varâhamihira. Only the following 16 species appear to be special to the Sukra Flora: (1) Tamarindus indica, (2) Santalum album, (3) Citrus medica, (4) Pyrus communis, (5) Myrica sapida, (6) Morus alba or Morus indica, (7)Spondias mangifera, (8) Pinus longifolia, (9) Juglans regia or aleurites moluccana, (10) Mimusops hexandra, (11) Pongamia glabra, (12) Garcinia xanthochymus, (13) Diospyros melanxylon, (14) Phyllanthus distichas or Anona reticulata, (15) Areca catechu, and (16) Cocos nucifera.

Here also one must not be blind to the *argumentum ex silentio.* Mere silence of Varâhamihira does not point to any plants being unknown or at any rate unfamiliar to him and his countrymen. Thus among the species mentioned in Sukranîti there are some which are indigenous to, or may be cultivated and naturalised in, all parts of India, and there is no reason why these should be peculiar to the Sukra Flora and not have been mentioned in the Ujjayini Schedule. Such cosmopolite species are (1) Tamarindus indica, and (2) Phyllanthus distichas or Anona reticulata. Compared with Ujjayini Flora, the peculiarity of Sukra Flora is thus more apparent than real.

There remain now 14 species peculiar to Sukra Flora, and this in a list of 35.

A further process of elimination is necessary to find out how far the Sukra Flora differs from the Ujjayini Flora. The seven species Santalum album, Citrus medica, Pinus longifolia, Areca catechu, Myrica sapida, Mimusops hexandra, Pongamia glabra and Juglans regia have a place in the Charaka Flora of earlier times. There is no special reason why these should not have been included, at least conventionally, in the Ujjayini list as well, like the cosmopolites we have just referred so.

The peculiar species of the Sukra Flora are thus reduced to six only:

(1) Pyrus communis (amrita)—rare.
(2) Morus alba or indica (tuda)
(3) Spondias mangifera (âmrâ).
(4) Garcinia xanthochymus (tamâla).
(5) Diospyros melanaxylon (kuddâla).
(6) Cocos nucifera (nârikela)

Among the *Âranvaka* (wild) and *kantakina* (thorny) species mentioned by the authors of the Sukra cycle, the following have not been mentioned in the *Brihat Samhitâ*: (1) Tectona grandis, (2) Acacia arabica, (3) Garcinia xanthochymus or Cinnamomum tamâla, (4) Holarrhena antidysenterica, (5) Cedrela toona, (6) Cedrus deodara, (7) Flacourtia sapida, (8) Carissa carandas, (9) Betula bhojapatra, (10) Strychnos nux-vomica, (11) Capparis aphylla, (12) Boswellia serrata, (13) Gmelina arborea, (14) Stephania hernandifolia, (15) Terminalia chebula, (16) Acacia farnesiana.

Here, again, we have to note several cosmopolite species which might be included in the Ujjayini list: (1) Tectona grandis, (2) Acacia arabica, (3) Holarrhena antidysenterica, (4) Carissa carandas, (5) Acaçia farnesiana, Thus we have altogether only 11 species which seem to be special to *Sukraniti*; and this in a list pf 34.

Here, again, by comparing Charaka,[1] Ujjayini and Sukra Flora we have to eliminate six species from the 11 as special to the last. These are Cedrus deodara, Cedrela toona, Boswellia serrata, Gmelina arborea, Stephania hernandifolia and Terminalia chebula.

Thus we have only five species left as peculiar to the Sukra Flora:

(1) Garcinia xanthochymus (Tâpinchchha or tamâla).
(2) Flacourtia sapida (vikankata).
(3) Betula bhojapatra (bhojapatra).
(4) Strychnos nux-vomica (viṣamuṣthi)
(5) Capparis aphylla (kariraka).

In the Varâha list we find that more than 50 per cent. of the Sukra Flora have been actually mentioned. Adding to them the plants that are very common to all parts of the country, and also those which must have been known to Varâhamihira, since they have been familiar even to the Charakans of pre-Buddhistic times, we have left a very small residue that is peculiar to Sukra Flora.

It thus appears that all the Flora mentioned in Sukraniti indicate an age far removed from the days of Islamic and Portuguese influences. On the strength of botanical evidences, other things remaining the same, there can be no objection to placing the Sukraniti during the period indicated by the farthest limit Charaka, and represented by the important land-mark of the sixth century A.D., the *Brihat Saṃhitâ*.

The close coincidence of Varâha and Sukra Flora leads to another important conclusion. This is about the *locale*. We have seen that the *Charaka Samhita*, being a medical work, had necessarily to be more all-India, encyclopædic and universal, so far as the vegetable kingdom was concerned. The Geography of the Charaka is therefore wide as a matter of course. But Varâhamihira, who was writing a treatise to guide the rulers of men, might be expected to be more local and address himself naturally to the needs of his own patron Bhoja, Vikramaditya? of Malwa. The chapters on agri-flori-horticulture in the Brihat Saṃhitâ constitute most probably a section dealing with the *Flora Malwensis* of the 6th cent. A. D. The absence of *Pinus longifolia*, *Cedrus deodara*, *Betula bhojapatra* and other purely Himalayan species in the Varaha list points to the local character of the Royal Botanical Garden at Ujjayini. So also the absence of *Areca catechu* and *Cocos nucifera* determines the horizon of Varâha Flora. The Varâha Flora is thus a local Ujjayini collection and represents the Upper Gangetic sub-region of Hooker's Botanical Provinces.

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[1] See the list of Plants in Charaka in *Vanauṣadhidarpana*, a Bengali work in two volumes by Kavirâja Gupta of Coochbehar (1908-1909). Also chapter VII of Gondal's *History of Aryan Medicinal Science* (1896), and Kaviraj Avinâs Chandra Kaviratna's English Translation of *Charaka Saṃhitâ* (1890-96), pp. 13-92.

Besides the close similarity in the lists of Flora between Varâha and Sukra, the very theory of Horti-Floriculture advocated in the treatises raises important issues regarding the time and place of Sukraniti. The two works may be compared on three topics: (1) planting of trees, (2) watering of trees, (3) nourishment of trees. According to the parallel passages and various readings in Mr. Oppert's notes, it appears that the theory of Sukraniti about watering and nourishment is found in only one text—the Bengal manuscript in the possession of Dr. Râmdâs Sen.

Both in matter and language the Sukraniti shows evidences of quotation, incorporation, paraphrasing and adaptation from Brihat Saṃhitâ by copyists or authors who knew geographical conditions more humid and fertile than those in Varâha's place. This has been described in a subsequent section.[1]

The geographical limits common to Vedic, Charaka, Varâhamihiran and Sukra Floras comprise the Upper Gangetic plain, as they include definitely the Malwa regions. The Sukra Flora, therefore, covers this tract together with the northern regions of Himalayan flora and the south-eastern regions of the Lower Gangetic or Deltaic flora.

(*D*) *Kâlidâsic Flora and Sukra Flora.*

The Flora of Kâlidâsa in the 18 cantos of *Raghuvaṃsam* from the nature of the case is an epitome of the Flora Indica known to the world of letters in his days. Like the *Râmâyaṇam* and *Mahâbhâratam* and many of the Purâṇas, the *Raghuvaṃsam* is an intensely national epic, the embodiment of Hindu India, of its ideals and ambitions, and covers the Geography, Zoology, Botany, Ethnology, and History of Hindusthan from Prâgjyotiṣa on the east to the land of the Pârasikas on the west, and from the territory of the Kirâtas on the North to the island of Ceylon on the south. The Raghuvaṃsa Flora is, therefore, no touchstone of the Sukra Flora as to its geography, though historically speaking, it supplies a good catalogue of plants, like that in Brihat Saṃhitâ, which were indigenous to and cultivated in India during the period between Hellenistic and Islamic influences.

But the *Meghaduta* of Kâlidâsa in which the cloud has been entrusted with message from a spot in Central India (Vindhyas) to a city on Mount Kailâsa in the Himalayas is more restricted in its botany. "In the first-half of the poem the Yakṣa describes[2] * * * Mount Âmrakuta on whose peak it will rest after quenching, with showers, the forest fires; the Narmadâ winding at the foot of the Vindhya Hills; the town of Vidisâ (Bhilsa) and the stream of the Vetravatî (Betwa); the city of Ujjayini in the land of Avanti; the sacred region of Kurukṣetra; the Ganges and the mountain from which she sprang, white with snow-fields; till Alakâ on mount Kailâsa is finally reached." As might be expected, the Meghaduta Flora is more extensive than Varâhamihiran,.as it covers the whole ground of mid-Âryâvarta in the longitudinal direction and includes the latter as only one of the types represented in it. The Himalayan flora has a special place in it, as the whole Second Book of the 'Cloud-Messenger' is devoted to a description of the city on Alakâ. But the eastern humid and littoral vegetation is entirely lacking in it.

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[1] See *Sukra* IV, iv, 92-93, 105-106, 107-108, 110 112, also p. 237 of Oppert's edition for various readings. *Vide Brihat Saṃhita* LV, 9, 12, 16, 17.

[2] Extract from Macdonell's *Sanskrit Literature* quoted by Mr S. C, Sarkar, M.A., of the Provincial Civil Service in the introduction to his English versical rendering of Meghaduta (City Book Society, 1906). See this work for the interesting geographical and botanical notes collected from the researches of Indian and European Scholars.

The 31 species enumerated by Mr. Manamohan Chakravarti[1] as constituting the Meghaduta Flora thus comprise the Malwa (Varâhamihiran) and Himalayan Flora, but exclude the Lower Gangetic. The Sukra Flora coincides in one of its aspects with this whole flora of Meghaduta, but in another respect goes beyond its limits.

The Geography of Sukra vegetation therefore includes that of Meghadutam, *i.e.*, mid-Âryâvarta as a sub-region, and Eastern Âryâvarta as another sub-region, but falls short of that of the Raghuvaṃsam which includes also the India south of the Vindhyas.

4. *Concluding Remarks.*

We have tentatively determined the Geography of the Sukra Flora by three independent evidences:

(1) Botanical Statistics proves it to be 'sub-tropical.'

(2) Ecology (including Meteorology and Phyto-geography) proves it to be 'Gangetic,' according to the nomenclature of Hooker.

(3) Literature or Comparative Botany proves it to be less Himalayan than Vedic and Charaka (and perhaps *Meghaduta*), less encyclopædic than *Raghuvaṃsam*, more Himalayan than Varâha, more extensive than Varâha as including (1) Himalayan and (2) Deltaic, more extensive than Vedic and Meghadutam as including Deltaic, and probably co-extensive with Charaka.

The Vedic Flora represents Indus Plain Province (Punjab, Sindh, etc.), the Charaka, though the work of an inhabitant of the Indus Plain, represents the flora of both the Indus and the Gangetic Plains (of Hooker), as well as of the Himalayas, *i.e.*, the whole of Northern India, Varâha Flora represents Malwa and the Upper Gangetic sub-region, Raghuvaṃsam represents the Flora Indica according to the conditions of Poetic Art, and Meghadutam represents the Upper Gangetic sub-region together with a portion of the Himalayas.

The Sukra Flora thus represents the Upper Gangetic plain, Himalayan regions as well as the humid deltaic and littoral sections of Eastern India.

As for chronology, literary history proves the Sukra Flora to be

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[1] Quoted by Mr. S. C. Sarkar in the Notes to his English *Meghaduta*. Mr. Chakravarti takes *Lodhra* to be *Bassia latifolia*. Really it is *Symplocus racemosa*, while *madhuka* would be *Bassia latifolia*. See Griffith's *Specimens of old Indian Poetry* (Pânini Office, 1914) for the whole poem in English verse.

Islamic[1] and does not prevent it from being at least as old as Charaka. Now Pre-Islamic means the period as late as the 8th century in Sindh, 10th century in the Punjab, 11th century in Kanauj (Upper Gangetic Plain) and 12th century (1193 A.D.) at Pâtaliputra and Gauda (Lower Gangetic plain). But, as our geography does not take us beyond the botanical limits of the Gangetic plain, the Sukra Flora may be placed at any period between the 6th century B.C. and 12th century A.D. And if the fact of incorporation and adaptation from Varâhamihira be admitted, both the Sukra Flora and the Sukra authors (at any rate, the Eastern copyists of *Sukraniti*) have to be placed after the 6th century A.D.

SECTION 4.

Forestry.

(*a*) *Non-economic.*

The Forests are important items in Indian social economy according to the authors of the Sukra cycle. The third and fourth stages or *âsramas* of Hindu life called *Vânaprastha* and *Yati* or *Sanyâsa* respectively have to be spent in the forests.[2] There are elaborate rules in all Smriti Sâstras regarding this retiring to, and life in, forests. The *Vânaprastha* stage is compulsory on all the four castes, but *Yati* on Brahmanas only. The function of men in the third stage is to restrain passions and activities, and in the fourth is to try to attain salvation.

Forests are the resort of people for non-Sâstric motives also. Among the general rules of morality we are told that one should prefer life in a forest[3] to being dependent on others. Then the exile of Râma in a forest[1] by Dasaratha's command also points to the forest being a resort of men. There are also persons who retire to forests[2] after knowing of complaints against them. The law enjoins that the king should summon such people to the court to answer the charge.

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[1] It would be interesting to study the history of cultivated plants in India. Such a work should be divided into two branches : (1) Geological—giving an account of the various elemental forces that have led to the existence of Malayan, Chino-Japanese, European, African and even American species in India, and (2) Historical—recording the successive efforts by which Chinese, Persian and European plants have been naturalised in India. Thus we know that tobacco and potato are very modern introductions due to the Portuguese (and other European) nations. So also the Mussalman Emperors were great patrons of Economic Botany, especially of Fruitery. We read in the *Ayeen Akbari* [Glawdin's Translation (1783), Vol. I., pp. 92-99]: "His Majesty is exceedingly fond of *fruit; and by the great encouragement that he has given to the cultivation of fruit-trees,* skilful people have come with their families from Persia and Tartary, and settled in his country." See Watt's *Dictionary of the Economic Products of India* and Dymock's *Vegetable Materia Medica of Western India*, for the history and uses of Indian plants. Cf. also, "Opium was first introduced into this country from Arabia. Its spread in India is synchronous with the advent of the Mahomedans who had adopted it as a suitable substitute for fermented liquors, which their religion discountenances. Some more drugs which happened to be introduced into India during the Mahomedan rule are :—Alu (*Prunus bocariensis*), Badian (*Illicium anisatum*), Banfasha (*Viola odorata*), Gaozban (*Onosma bracteatum*), etc."—*History of Aryan Medical Science* by the Thakur Sahib of Gondal, pp. 125-127. (Edition, 1896).

[2] Sukra IV, iv. 1-5.

[3] Sukra III, 576-577.

The law of the realm has to provide for several classes of cases pertaining to forest. Thus if a bound-down man violates the limitations imposed upon him when crossing a forest[3] or going through a difficult region, he is not guilty and should not be punished. So also in the cases of offences committed in forests[4] *i.e.*, inaccessible regions where human evidences, *e.g.*, witnesses, &c., are not easily available, Sukrâchâryya ordains that divine *Sâdhanas* or ordeals should be resorted to. Then again among the several instances of trial by peers we read that "foresters[5] are to be tried with the help of foresters."

The existence of both religious and legal regulations points to forests being important topographical features of the country of Sukrâchâryya. So they are; for among the general rules we read that (1) one should not visit solitary forests,[6] unoccupied houses, and cremation grounds even by day, and (2) one should always travel with companions, and while travelling, should not take rest on roads or in forests.[7]

That forests are familiar sights to the authors of the Sukra cycle would be evident from the characteristic analogy drawn by them in the following lines. "One should bring to bay or discipline, by the hook of knowledge, the elephant of the senses which is running to and fro in a destructive manner in the vast forest[8] of enjoyable things."

The statesmen of the Sukra cycle, therefore, are judicious enough to devise ways and means for utilising the forests, in order to promote the prosperity and importance of their state. They have prescribed hunting excursions among the functions of the king. "He should sport with tigers, peacocks, birds and other animals of the forest,[9] and in the course of the hunting should kill the wild ones." The *Arthasâstra*[10] of Kautilya is more explicit on the point. We read that Chandragupta had a hunting forest exclusively for his own use. It was provided with only one entrance and had a canal running round it to ward off intrusion. Inside were planted fruit-trees, thornless trees, &c. There roamed at large not only the wilder games, but also some of the wilder ones, deprived of their natural offending weapons. * * * Besides the imperial hunting forest, there was another public forest thrown open to all persons willing to hunt."

The forests are, like mines, important sources of Government revenue according to the financiers of the Sukra cycle. The *Sumantra* or Finance minister has to take a census [1] of the forests and study the income accruing from them.

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[1] Sukra II, 63.

[2] Sukra IV, v. 214-215.

[3] Sukra IV, v, 210-211.

[4] Sukra IV, v, 509-11.

[5] Sukra IV, v, 44-45.

[6] Sukra III, 60.

[7] Sukra III, 124.

[8] Sukra I, 193-194.

[9] Sukra I, 665-666.

[10] Law's *Studies in Hindu Polity*.

The forests have been utilised by the Sukra statesmen for military purposes also. Among the various classes of forts we have the *vanadurga* or forest fort,[2] which is encircled by huge thorns and clusters of trees. This type of forts is superior[3] to that which is surrounded by ditches and also that which is protected by walls of bricks, mud and stones. It is, however, inferior to the desert-forts, water-forts and hill-forts.

Then an important division of the army seems to consist of people living in forests, who ordinarily are independent and do not perhaps acknowledge the suzerainty of the ruler. The king should, however, be sagacious enough to make use of them for his military defence. The section of the army composed of such recruits is called *sâdyaska*[4] *i.e.*, new or raw, as opposed to the *maula*, *i.e.*, standing or permanent. It is also called *agulmaka i.e.*, one which is not officered and divided into regiments by the state, but brings its own officers and fighting apparatus. The Kirâtas and people living in forests who are dependent on their own resources and strength constitute this division of the state army.

It is one of the counsels of diplomacy to try to win over these forest tribes to one's side by hook or by crook. " Peace should be made even with *anâryas*,[5] for otherwise they can overpower the ruler by attack ;" whereas, on the contrary, if the ruler be wise enough to grant them timely concessions, reward, &c., they may stand him in good stead in times of emergency by making the enemy's progress impossible. " Just as a cluster of bamboos cannot be destroyed if surrounded by thick thorny trees, so the ruler should be like a bamboo surrounded by clusters." Such foresters as enter Government service or are otherwise useful to the king should have quarters reserved for them just outside the city limits.[6]

(*b*) *Economic.*

The economic importance of forests now remains to be considered. They are the sources of fuel, fodder, grass and timber. According to the Sukra statesmen the king should lay siege[7] to the enemy's country from such a position as to destroy " carefully the people who help the enemy by carrying wood, water and provisions." The military manœuvres and tactics should also be dilatory and spread over a long period of time—in order that " provisions of the enemy may be cut short and food and fuel diminished." Again, " the powerful should coerce the enemy by stopping the supplies of water, provisions, fodder, grass, &c., in an unfavourable region."

Not only in warlike operations but also in the normal functions of states, Sukrâchâryya recognises the value of forests in the ordinary secular life of the people. The regulations relating to the site[1] for the building of the capital pay due heed to this. The place is to be one which "abounds in various trees, plants and shrubs, and is rich in cattle, birds, and other animals, is endowed with good sources of water and supplies of grains, and is happily provided with resources in grasses and woods." Then, again, the collection of grasses and woods in forests has been recognised as one of the occupations and means of livelihood, and it is important enough to be reckoned in Sukra's comprehensive scheme of taxation. "The king should realise one-third, one-fifth, one-seventh, one-tenth or one-twentieth from the collectors of grasses,[2] woods &c."

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[1] Sukra II, 207-8, 211-212.

[2] Sukra IV, vi, 5.

[3] Sukra IV, vi, 11-12.

[4] Sukra IV, vii, 22-28.

[5] Sukra IV, vii, 482-84.

[6] Sukra I, 506-12.

[7] Sukra IV, vii, 570-73.

Last but not least in economic importance are (1) the *kantakinah*[3] or thorny trees which according to Sukrâchâryya should be planted in forests, (2) *phalinah*[4] or fruit-bearing trees which should be planted very near the village, and (3) other expansive trees, shrubs,[5] creepers, &c., which are to be carefully planted in villages, if domestic, in forests, if wild.

The classification is not at all scientific, as we have noted in a previous section. All the plants enumerated by Sukra might have been mentioned together in one list, for they all belong to the 'Flowering' or *Phanerogam* division according to the Taxonomy of modern Botanists. Economically speaking, again, this classification serves the purpose well so far as it goes, *i.e.*, as a convenient means of knowing which species may be planted in and near the homestead, and which species should be planted at a distance. But it is not the intention of the Sukra authors, nor should we interpret the classification to mean, that the *Âranyaka* or wild and forest flora are in any way less useful to man than those which have been regarded as domestic. For, from the standpoint of Utilitarian Botany, both the classes are of equal importance.

Sukrâchâryya has adopted only one principle of economic classification, *e.g.*, that into domestic and wild. The result is that each of these groups may be sub-divided (*a*) geographically into evergreen, deciduous, or otherwise as we have seen in a previous section,[6] and (*b*) economically into medicinal, industrial, etc.

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[1] Sukra I, 425-428. Cf. Kâmandaki Niti, iv, 50-56.

[2] Sukra IV, ii, 237-38.

[3] Sukra IV, iv, 113-114.

[4] Sukra IV, iv, 103.

[5] Sukra IV, iv, 123-124.

[6] The deciduous forests yield sâl, teak, sandal, ebony, and valuable genera, *e.g.*, Terminalia, Anogeissus, Acacia (Acacia catechu) and other trees that supply the wood oils and varnishes largely used in the domestic life of the inhabitants of the country. * * Among trees characteristic of evergreens may be mentioned Terminalia, Cedrela toona, the wild mango, &c. Pinus longifolia flourishes at lower elevations and finally mixes with the deciduous forests of the plains. See the Chapter on *Forests* in the Economic Volume of the *Indian Empire* in Imperial Gazetteer Series, and *Brihat Samhitâ* LXX 2-4, for Hindu ideas about Timber.

Uses of Plants.

"There is no plant[1] which has no medicinal properties," says Sukrâchâryya; and all the plants mentioned by the Sukra authors have one or other use in Hindu Pharmacopœia. The fact that Charaka mentions almost all of these in his *materia medica* points to this.

The Sukra Flora, whether belonging to the domestic or wild class contains:

(1) Timber trees, *e.g.*, Capparis aphylla, Garcinia xanthochymus, Calophyllum inophyllum, Bombax malabaricum, Feronia elephantum, Ægle marmelos, Zizyphus jujuba, Terminalia arjuna, Bassia latifolia, Ficus bengalensis, Ficus glomerata, Ficus religiosa, Phœnix sylvestris, Areca catechu, Dendrocalamus strictus, &c;

(2) Food plants, *e.g.*, Capparis aphylla, Garcinia xanthochymus, Flacourtia sapida, Bombax malabaricum, Ægle marmelos, Feronia elephantum, Mangifera indica, Mimusops elengi, Bassia latifolia, Aleurites moluccana, &c.;

(3) Famine plants, *e.g.*, Bassia latifolia, Ficus bengalensis, glomerata, geligiosa, Santalum album, Phœnix sylvestris, &c.;

(4) Fermented drinks, *e.g.*, Bassia latifolia, Calotropis gigantea, Cocos nucifera, Phœnix sylvestris, Saccharum officinalis, &c.;

(5) Oil-yielding plants, *e.g.*, Bassia latifolia, Semecarpus anacardium, Pongamia glabra, Butea frondosa, Terminalia bellerica, Chebula, Bassia latifolia, Cocos nucifera, Santalum, album, &c.;

(6) Fibrous plants, *e.g.*, Butea frondosa, Calotropis gigantea, Ficus religiosa, bengalensis, Morus alba, Cocos nucifera, Phœnix sylvestris, &c.;

(7) Dyes, *e.g.*, Garcinia xanthochymus, Zizyphus jujuba, Butea frondosa, Acacia arabica, suma, catechu, Terminalia chebula, Woodfordia floribunda, Artocarpus lakoocha, Tectona grandis, &c.;

(8) Gums and resins, *e.g.*, Spondias mangifera, Bombax malabaricum, Feronia elephantum, Mangifera indica, Semecarpus anacardium, Butea frondosa, Terminalia bellerica, &c.;

(9) Vegetable soaps, *e.g.*, Acacia arabica;

(10) Vegetable poisons, *e.g.*, Semecarpus anacardium, Strychnos nux-vomica.

(11) Vegetable antidotes to Snake-bites, *e.g.*, Euphorbia neriifolia;

(12) Fodder, *e.g.*, Dendrocalamus strictus, Cicer arietinum, Ægle marmelos, Cedrela toona, Butea frondosa, Ficus bengalensis, &c.; and

(13) Sacred Flora.

We have to notice in connexion with the economics of Forest Flora that some of the plants in *Sukraniti* are valuable from their uses in religious rites and ceremonies of the Hindus. One of the reasons for the inclusion of Butea frondosa, Calotropis gigantea, Ficus glomerata, religiosa, Mangifera indica, Citrus medica, Melia azadirachta, Ionesia asoka, Ægle marmelos, Michelia champaka, etc., in the Sukra Flora might be due to their importance in Hindu religious life.

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[1] **Sukra II, 254-255.**

We have not mentioned the various uses[1] which people make of the plants, trees, or shrubs that have not been included in the two lists given by Sukra but referred to incidentally. Some of those plants which have been mentioned casually, *e.g.*, cotton, bamboo, &c., might be well-included in the two lists. The multifarious uses of the cereals, &c., whether as edibles or industrial ingredients, have also been purposely avoided here, since, though they may, like the others, be treated in connexion with forests and forest produce, they have not been mentioned by the Sukra authors separately as forming a class by themselves. All these casual references will be treated in a subsequent section in connexion with the uses made of them by Sukrâchâryya.

It must have been clear from the foregoing account that each of the plants mentioned by the Sukra authors serves more purpses than one, and that it is not possible to make any classification, from the standpoint of Economic Botany, without running the risk of overlapping and cross division. Incidentally also we are led to think that the country of Sukrâchâryya is not a purely agricultural one, but is industrial as well. In fact, among the 64 arts or *kalâs* we have several connected with plants. These come under two heads: (1) Medical Botany and (2) Industrial Botany.

Like mineralogy, Medical Botany is an important branch of Ayurveda; and among the 10 *kalâs* mentioned in this science, we have, according to Sukrâchâryya, the following five pertaining to the vegetable kingdom alone, *e.g.*, (1) distillation of wines and spirituous liquors from flowers, (2) extrication of thorns (3) planting, grafting and preservation of plants, (4) use of preparations from sugarcanes, (5) mixtures of metals and medicinal plants.

Wines.

References to wine and spirituous drinks are frequent in Sukranîti:

(1) One of the 64 kalâs is the distillation of wines[3] and spirituous liquors from flowers, &c.

(2) Three general rules of morality have reference to liquor and enjoin temperance upon the people:

- (i) One should not visit liquor-houses at night.[4]
- (ii) One should not sell liquor.[5]
- (iii) One should not get intoxicated with spirituous liquors.[6]

(3) Drinking, however, is better than other vices:

- (i) "Even the king who is a drunkard[7] is good, but not he who is very angry and addicted to women. For the severe man irritates or alienates the subjects, but the other destroys the castes only." It is evident that according to Sukra morality the vice which leads to civic and political deterioration or ruin is of a blacker dye than that which touches the social life only.

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[1] See the Botanical Volume of the *Bombay Gazetteer*, Economic Volume of the *Indian Empire* in Imperial Gazetteer (Chapters on Agriculture and Forests), and also Watt's *Dictionary of the Economic Products of India.*

[2] Sukra IV, iii, 141-47.

[3] Sukra IV. iii. 141.

Sukra III, 57-59.

[4] Sukra III, 63-64.

[6] Sukra III, 242.

[7] Sukra IV, i, 124-25.

(ii) "The man who drinks wine[1] is deprived of his intelligence and loses his business." But the result is not very criminal.

(iii) Moreover, "passion and anger are greater intoxicants than wine.[2] Greed is the cause of destruction of the life and property of subjects." Hence the king should give up these three.

(4) With regard to temperance, Sukra authors really follow the *via media*. For rulers as well as for people Sukrâchâryya advises the golden mean :[3]

(i) Of the man who drinks wine excessively, intelligence disappears.

(ii) But wine, drunk according to some measure, increases the talent, clarifies the intelligence, augments patience, and makes the mind steadfast ; but otherwise it is ruinous.

(iii) Sensuousness and anger are like wine and should be duly indulged in—the former for the maintenance of the family, the latter against enemies.

(5) The laws of the land with regard to wines are stated below :

(i) Without the permission of the king, the following are not to be done by the subjects—drinking, distillation of wines.[4]

(ii) The Gânjâ house (liquor house) or tavern should be kept outside the village and the drunkards should be kept there. The king should never allow drinking[5] of liquor in his kingdom in the day time.

Plants in relation to other kalâs.

Besides Agri-flori-horti-arbori-sylvi-cultural facts and phenomena recorded in Sukranîti, there are the industrial[6] or manufactural aspects of Economic *i.e.* Utilitarian Botany referred to casually by the Sukra authors. The *Periplus* mentions, among other articles of trade that passed through the ports on the Arabian and Bengal coasts in the first century A. D., pepper, betel, spice, wine, wheat, sandal, aghil (kind of black aromatic wood). These uses of flora as commercial merchandise, *i.e.*, articles of trade or as raw materials for the thousand and one arts and industries in secular life demand our attention here. The mention of or allusion to these industrial facts in Sukranîti is to be noticed mainly in the sections dealing with the 64 *kalâs* and with the list of artisans to be maintained by the state, but should also be sought here and there and everywhere in the treatise. References to construction of bridges, boats, cars, chariots, war-implements, arms and weapons, wooden images, temples, palaces, forts, ploughs, &c., as well as other processes and products that point to the utilisation of timber and the art of the carpenter, are instances in point, and bespeak the existence of timber-merchants as well as various grades of wood-carvers and carpenters connected with domestic, religious, architectural, military and agricultural arts.

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[1] Sukra IV, i, 126.

[2] Sukra IV, i, 127-129.

[3] Sukra I, 229-233.

[4] Sukra I, 603-8

[5] Sukra IV, iv, 89-90.

[6] See Baden Powell's *Punjab Manufactures* (1872) pp. 74-91, 203-14, Birdwood's *Handbook to the Indian Section* (Paris Universal Exhibition, 1878) pp. 77-79, 83-81, Maffey's *Monograph on Wood Carving* (U. P. 1903) pp. 10-14, Wales' Monograph on Wood Carving (Bombay, 1902) pp. 2-3, also the historical works on Indian art quoted several times.

We have also noted the Ayurvedic preparations from the vegetable drugs of the country mentioned in Sukraniti, as well as the trade in medicinal herbs, suggested by various passages in it. We have already noted the mention of honey as a floral produce.

Other *kalâs* or industries connected with plants are (1) cleansing, polishing, dyeing, &c., of wooden vessels,[1] (2) preparation of boats, chariots and conveyances[2] (3) preparation of threads[3] and ropes, (4) weaving of fabrics by various threads,[4] (5) extraction of oil from seeds,[5] (6) climbing of trees,[6] (7) preparation of vessels with bamboo, straws,[7] &c., and (8) making and preservation of betels.[8]

(*c*) *Administration.*

Sukranîti thus bears testimony to the varied importance of forests in the economy of social life. The Sukra statesmen, therefore, have organised a special department of the state to look after the interests involved in its vegetable resources.

The department is broadly divisible into two sections: (1) Parks, public grounds or pleasure-gardens and (2) Forests, strictly so called.

The Sukra statesmen advise the king to give away lands for the gods, for parks and public grounds,[9] and for dwelling-houses to the peasants," but for no other purpose. Among the general laws of the land we have, "you must never obstruct the tanks, wells, parks,[10] boundaries, &c." The parks are the resorts of people as well the king for recreation ; and Sukrâchâryya advises the ruler to cultivate social habits in such places. "In parks[1] and places of entertainment, the king should carefully indulge in enjoyments with the people, women, actors, musicians, poets, and magicians." The encyclopædic scheme of general culture devised by the Sukra statesmen is thus adapted to make of the king a perfect gentleman according to the ideas of the time, and quite up to date in notions, tastes, and sentiments.

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[1] Sukra IV, iii, 167-168.

[2] Sukra IV, iii, 173. The uses and classes of timber and all such questions relating to the "strength of materials" have been detailed in *Yukti-kalpataru*. This work has been utilised by Râjendrâlal in his description of Hindu Furniture and Prof. Radhakumud in the *History of Indian Shipping*. cf. also *Brihat Samhitâ*.

[3] Sukra IV, iii, 174.

[4] Sukra IV, iii, 175. See some of the traditions connected with the origin of the weaving art in pp. 2-3 of Silberrad's *Monograph on Cotton Fabrics* (&c. p. 1898), the chapter on Fibrous Manufactures in Baden Powell's *Punjab Manufactures*, pp. 74-91, and Birdwood's *Paris Universal Exhibition* 1878, pp. 88-110. cf. also Thurston's *Monograph on Cotton Fabric Industry* (Madras, 1897) and Twigg's *Carpet making in the Bombay Presidency* (1907).

[5] Sukra IV, iii, 187.

[6] Sukra IV, iii, 188.

[7] Sukra IV, iii, 190.

[8] Sukra IV, iii, 198.

[9] Sukra II, 423-424.

[10] Sukra I, 601-602.

Parks do not seem to have been insignificant features of social life in Sukra's days. They are important enough to have given rise to special classes of skilled artisans. So the advice is that among goldsmiths, gunners, miners, &c., who deserve the patronage and 'protection' of the state should be included men who "construct parks,[2] artificial forests and pleasure-gardens." Nor is this all; they are also considerable enough to have been regarded as important items of state 'consumption.' The expenditure on parks is also definitely mentioned as one that belongs to the upabhogya[3] class.

The second section of the Forest Department has jurisdiction over forests properly so called. The parks[4] are meant for health, recreation, enjoyment, &c., and constitute the spending department pure and simple; whereas the forests, as we have seen in the previous section, are important sources of national wealth as well as Government revenue. Both these sections, however, are under the management and control of an officer, called the *ârâmâdhipati*[5] or the Superintendent of Parks and Forests. The qualifications of the Forest-officer, according to Sukrâchâryya, should be a sound knowledge of agri-flori-horti-culture. He is to "know the causes of the growth[6] and development of flowers and fruits, the methods of planting and curing trees by the administration of proper soil and water at the suitable time, and the various uses of plants as medicinal drugs."

The Forest-officer is called *kupyâdhyakṣa* in the *Arthasâstra* of Chânakya.[7] He (1) is in charge of the imperial hunting forest, (2) public hunting forest, and (3) has to perform a duty in connexion with the live-stock, *viz.*, the capture, when needed, of birds and beasts that live in the forests under his jurisdiction.

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[1] Sukra I, 661-62.

[2] Sukra II, 83.

[3] Sukra II, 689-91.

[4] See the description of Parks and Forests in *Kâmandaki*, XIV, 27-42. Kâmandaka has devised the scheme of a regulated and restrained indulgence in *Mrigaya* or hunting and sportsmanship for the king, by purposely allowing the construction of such parks and forests. According to him, these are the necessary institutions of a state, and hence inevitable charges upon the public revenues, for otherwise the king may be tempted to undertake "wild goose chase" and indulge in excessive hunting which would thus degenerate into a vicious *vyasana*.

[5] Sukra II, 240.

[6] Sukra II, 317-319.

[7] See in the *Modern Review for August*, 1911, the paper on the Department of Live-stock in Chandragupta's Administration by Narendranath Law.

The great assembly (*Mahâsabhâ*) of the village, the unit of administration in the Chola Empire, was divided into several committees—one of which was elected for the supervision of gardens.

The following extract from Mr. Aiyangar's *Ancient India*[1] gives an idea of the importance of flower-gardens in mediæval Chola life (800-1100 A.D.): "The third published inscription records that a certain Perran Adittan of the Chola country purchased two pieces of land, and made over both pieces to the villagers for maintaining a flower-garden. * * * Having received in full the purchase-money and the revenue of the land and having exempted the flower-garden (and the land assigned) for the maintenance of the garden from taxes for as long as the moon and the sun exist, we the assembly engraved this on stone."

We are not sure if, besides having a knowledge of the matters connected with the *direct* utility of forests, the Superintendent of Parks and Forests in *Sukraniti* and *Arthasâstra* is to have also a knowledge of their *indirect* utility, *e.g.*, "that through the influence which they exercise upon climate, the regulation of moisture, the stability of the soil, the healthiness and beauty of the country and allied subjects." That this topic, however, was not wholly unstudied by the Hindus of yore may be demonstrated by references to Chapters XXIX, LIV, and LV of Varâhamihira's *Brihat Saṃhitâ*, which, "although an astrological work, contains," according to Dr. Kern, "important astronomical data, and its value for geography, architecture, sculpture, etc., is unequalled by any Sanskrit work as yet published."

In the following section we have quoted Varâhamihira's ideas about the influence of plants on (1) other plants and (2) climate. Varâhamihira's theory of Sylviculture guarantees the forecast of rain, storm, drought, health, famine, destructive fire, disease, &c., from the growth or otherwise of certain plants.

The following extract from *Encyclopædia Britannica* supplies interesting information regarding Forestry:[2]

"In early times there was practically no forest-management. As long as the forests occupied considerable areas, their produce was looked upon as the free gift of nature, like air and water; men took it, used it, and even destroyed it without let or hindrance. With the gradual increase of population and the consequent reduction of the forest area, proprietary ideas developed; people claimed the ownership of certain forests and proceeded to protect them against outsiders. Subsequently the law of the country was called in to help in protection, leading to the promulgation of special forest law. By degrees it was found that mere protection was not sufficient and that steps must be taken to enforce a more judicious treatment. The teaching of natural science and political economy was brought to bear upon the subject, so that now forestry has become a special science."

The history of forest administration in British India is being given from the same source: "With the advent of British rule forest destruction became more rapid than ever. * * * Then railways came and with their extension the forests suffered anew, partly on account of the increased demand for timber and firewood, and partly on account of the fresh impetus given to cultivation along their routes. Ultimately, when failure to meet the requirements of public works was brought to notice it was recognised that a grievous mistake had been made in allowing the forests to be recklessly destroyed. Already in the early part of the 19th century sporadic efforts were made to protect the forests in various parts of the country; and these continued intermittently; but the first organised steps were taken about the year 1855. * * In 1864 an organised state department was established."

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[1] Pp. 160, 164, 169.

[2] Article on *Forests and Forestry* in Encyclopædia Britannica, 11th Edition.

The importance of forests in Indian life is thus described by Mr. S. Eardley-Wilmot, Inspector-General of Forests in the Economic Volume of the *Indian Empire*[1] in the Imperial Gazetteer Series: "The grazing which they annually afford to countless herds assumes a special value in years of drought, when it renders material assistance in saving from starvation the cattle upon which the agriculture of the country depends. They afford the villagers who live in their vicinity a ready supply of material for house-building and thatching, of fuel, and of minor forest products, which add substantially to the comforts of their life. And the use of forest leaves as manure for the cultivator's fields has already assumed large dimensions."

About the Hindu idea regarding Protection of forests and trees we have the following from the *Siddhânta Dîpikâ* for December, 1906:—

"Dewan Bahadur R. Raghunath Rao writes in the *Madras Standard* as follows:—I am afraid this is not generally known to the European public what the feelings and opinions of the Hindus are regarding forests and trees. Their religion tells them that trees have souls like men; that cutting down a living tree is as bad as killing a living man; that their twigs, even branches, leaves, when absolutely required, should be removed without any harm to the trees; that only dried trees should be cut down for fuel; that forests should not be destroyed because, in addition to other reasons, they are the residence of the third and fourth Âsramas of the Dwijas; that trees also are the tabernacles of God, and that to plant a tree is a virtuous act, and so on.

"The Hindus do not and cannot therefore advocate the indiscriminate destruction of forests. There is a belief that one is allowed to live in a more pleasant world than this, so long as the trees planted by him here exist. Any indiscriminate destruction of trees is very abhorrent to a true Hindu."

SECTION 5.

Horti-Flori-Arbori-culture.

The gardener and weaver of garlands are two of the familiar members of the community described by the authors of the Sukra cycle. It is their arts that supply the analogy for a judicious 'exploitation.' Sukra says: "The gardener collects flowers and fruits,[1] after having duly nourished the trees with care. The collector of taxes is to be like him." Again, "the best king is he who, by following the practice of the weaver of garlands,[2] protects his subjects, makes the enemies tributaries and increases the treasure by their wealth." Further, "the king should receive rent from the peasant in such a way that he be not destroyed. It is to be realised in the fashion of the weaver of garlands[3] and not of the merchant who deals in fuel and firewood."

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[1] See the chapter on Forests for an account of their economic and financial importance in modern India.

We have two sets of officers in *Sukraniti* for discharging two kinds of functions in connexion with vegetables:

(1) The superintendent of parks and forests studies the growth and development of plants in *gardens*, parks, forests, &c., and is well up in the *kalâ* that relates to these, and

(2) The superintendent of grains who discovers the good ones by discriminating them from the worthless.

(*a*) *Sukrâchâryya on Practical Gardening.*

The following are the rules about the planting of trees[4] in gardens or forests to be observed by the superintendent :

(1) The good plants are to be placed at a distance of 20 cubits from one another.

(2) The middling plants are to be placed at a distance of 15 cubits from one another.

(3) There should be a space of 10 cubits between two ordinary plants.

(4) The space should be 5 cubits between two youngest plants.

The following rules relate to the watering of plants :[5]

(1) In summer the trees are to be watered twice in the morning and in the evening.

(2) In winter they are to be watered every alternate day (or at mid-day).

(3) In spring they should be watered in the fifth part of the day, in the afternoon.

(4) In the rainy season the plants do not require any watering.

The following rules are to be observed with regard to the nourishment of plants :

(1) Stools of goats, sheep and cows,[6] water as well as meat should be generally used to promote the healthy growth of plants.

(2) In abnormal cases the following recipe is to be tried : "If trees have their fruits destroyed, the pouring of cold water after being cooked together

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[1] **Sukra II, 345-46.**

[2] **Sukra IV, ii, 35-38.**

[3] **Sukra IV, ii, 222-23**

[4] **Sukra IV, iv, 91-93. *Cf. Brihat Samhitâ*, LV, 9.**

[5] **Sukra IV, iv, 105-106. *Cf. Brihat Saṃhitâ*, LV, 15.**

[6] **Sukra IV, iv, 94.**

with Kulutha (dolichos biflorus), mâṣa (phaseolus radiatus), mudga, (phaseolus mungo), yava (hordeum vulgare), and tila (sesamum indicum) would lead to the growth of flowers and fruits."[1]

(3) A third process consists in the application of water with which fishes are washed and cleansed.[2]

(4) The fourth recipe is given below : The powder of the dungs of goats and sheep, the powder of hordeum vulgare, sesamum indicum, beef[3] as well as water should be kept together undisturbed for seven nights. The application of this water conduces very much to the growth of all trees in flowers and fruits.

As for the sites where particular plants are to be placed the following are the rules:

(1) Those trees which bear good flowers should be planted very near the village.[4]

(2) A fair garden should be laid out to the left of the dwelling-house.[5]

(3) Those trees which bear thorns, *e.g.*, acacia catechu are known as *Âraṇyaka* and should be planted in forests[6].

(4) Expansive trees, shrubs and creepers are to be carefully planted in villages, if domestic, in forests, if wild.[7]

The knowledge of grafting[8] is certainly one of the qualifications of the gardener, as it is known to be one of the sixty-four *kalâs*.

(*b*) *Varâhamihira on Ecology.*

A few notions of the Hindus regarding the connexion between plant life and its environment (both botanical and meteorological) are given below from *Brihat Saṃhitâ*,[9] and are to be taken for what they are worth:

(1) Judging from the growth of the fruits and flowers of trees and plants we may determine beforehand what articles can be had cheap and in abundance and what crops will thrive.

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[1] Sukra IV, iv, 107-108. Cf. Brihat Saṃhitâ LV, 16. In the chapter on Empirical Recipes from Varâhamihira, relating to Chemical Technology, Dr. Seal remarks : "It will be seen that these elaborate recipes are empirical contrivances for supplying the requisite nitrogen compounds, phosphates and bacteria, these being potentially contained in the mixtures and infusions prescribed." *Vide* Ray's *Hindu Chemistry*, Vol. II. pp. 285 90.

[2] Sukra IV, iv, 109.

[3] Sukra IV, iv, 110-112. Cf. *Brihat Saṃhitâ* LV, 17-18.

[4] Sukra IV, iv, 103. The plants have been enumerated in a previous section.

[5] Sukra IV, iv, 104. cf. also Bacon's *Essays*.

[6] Sukra IV, iv, 113-114.

[7] Sukra IV, iv, 123-124.

[8] *Sukra IV, iii, 144.*

[9] See chapter XXIX. 1, 14. cf. also "If mango tree should thrive well, there will be prosperity in the land ; if bhallâta should thrive, there will be fear ; if peelu (Dillenia speciosa), there will be health ; if khadira and śamî, there will be famine ; if arjuna, there will be good rain. If kapittha *should bear blossoms, there will be storm ; if nichula* (Barringtonia acutangula) should bear blossoms, there will be drought ; and if kutaja, there will be disease."

(2) There will be good rain in those countries where trees, shrubs and creepers grow luxuriantly with glossy leaves uninjured by worms, but if the leaves should be otherwise there will be little rain.

These two principles sum up what in Varâhamihira's time (6th century A.D.) constituted the results of scientific observation regarding plants (1) in relation to other plants and (2) in relation to the atmospherical conditions. The first has in modern times developed into the science of ecology, and the second into that aspect of the science of forestry or sylviculture which deals with the influence of vegetation on temperature, humidity and climate.

The following interesting extracts from *Brihat Saṃhitâ* would give an idea of Varâhamihira's economic ecology:

(1) If the sâla tree should bear fruits and flowers, karama (white rice) will grow in abundance; if the red asoka should bear fruits and flowers, red paddy will grow; if the kṣirika should bear fruits and flowers, white paddy will grow; and if the black asoka should bear fruits and flowers, black rice will grow.

(2) The growth of the nyagrodha (the banyan tree) indicates the growth of barley; the growth of tinduka indicates the growth of the sastyaka rice; and the growth of the aswattha indicates the growth of all crops.

(3) The growth of madhuka indicates the growth of wheat, and the growth of saptaparṇa indicates the growth of the barley, etc., etc , etc.[1]

It would be better to describe this Hindu ecology of the early Christian era as Astrological Botany. It may be surmised that the forester, superintendent of parks and the gardener of those days were acquainted with all these notions about the principles of plant life. These look very much like the sayings of the celebrated Khanâ—the most popular agricultural lore of Bengal.

Likewise, the gardener of old must have been familiar with the following views of the scientist of the court of Bhoja Vikramâditya :

(1) The sides of rivers[2] and lakes and other water-banks will not be pleasant and agreeable, if devoid of shady trees.

(2) Soft soil is congenial to the growth of all trees. Such a soil should be selected for the garden, and the sesamum plant should first be grown in it.

(3) Trees that grow without branches shall be grown in the Sisira season, and in the Hemanta shall be grown trees that grow with branches; in the winter season shall be grown trees possessing good trunks.

(*c*) *Sukra* vs. *Varâha.*

We may compare and contrast the horticutural ideas of Sukrâchâryya with what we may look upon as the practice in the Royal Garden at Ujjayini in the 6th century. We have the following lines in *Brihat Samhitâ*: (1) " In the dry season[1] the trees shall be watered both in the morning and evening; in the cold season they shall be watered every alternate day (at mid-day?); and in the rainy season whenever the ground is found dry."

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[1] See Iyer's *Brihat Saṃhitâ* pp. 138-140. The accounts of plants that by their growth or otherwise indicate rise or fall in the supply of metals, gems, livestock, &c, and prosperity or adversity of certain classes of men, *e.g.*, princes, ministers, &c., should also be noted. *cf.* also Sen's *Bengali Literature* for the sayings of *Khanâ*.

[2] *Brihat Saṃhitâ* LV., 1, 2-6.

The fact that even in the rainy season plants require watering indicates the great absence of humidity in the soil of Malwa for which Brihat Saṃhitâ was probably written; and the fact that the Sukra authors advise no watering during the rainy season points to an opposite state of things—copious rainfall, natural moisture in the soil, &c., known to them. We have also to note that Varâha mentions only three seasons, whereas in Sukra we have six, though with regard to watering of plants only four of them are mentioned. It may be inferred from all this that Sukra's rules are the results of observation of a more humid than the Varâha flora. This would very well suit the topographical conditions of Eastern India.[2]

(2) An interval of 20 cubits[3] between trees is the best; one of 16 is passable; and one of 12 is injurious. The trees that are planted very near each other get their branches interwoven as well as their roots, and such trees get choked and cannot grow well.

But according to Sukrâchâryya intervals of 15, 10 and even 5 are allowed. Here again we may consider the difference to be due to two characteristics of soil,—one being more fertile or humid is more capable of bearing vegetation per foot than the other which is drier and more barren. Sukra's rules therefore are adapted to the topographical features of luxuriant flora, while Varâha's to those of arid vegetation.

The horti-flori-arbori-cultural theories advocated by the authors of the Sukra cycle are thus "relative" to, and indicative of, the botanical conditions of a more humid and productive region than Malwa. This is Eastern India.

The Botanical evidences thus all point to the *locale* of Sukra flora and Sukra authors being somewhere in Eastern India. Comparing the texts of Sukranîti and Brihat Saṃhitâ as regards the watering and planting of trees we may also presume, unless there be other evidences, that:

(1) the difference in treatment is the conscious work of Eastern authors or copyists, and

(2) the authors or copyists of Sukranîti, in quoting passages from Brihat Saṃhitâ or from floating literature, adapted them to the local conditions of the Eastern kingdom.

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[1] *Brihat Saṃhitâ* LV, 9.

[2] This would be evident from a comparison of the Sanskrit texts also. Line 105 of IV, iv, of Sukra is exactly the same as the first half of the Sloka 9 of LV of Brihat Saṃhitâ. It is only the second half that differs from each other. It has to be noted again that the lines in Sukranîti (104-112) are to be found in only one of the six texts on which Mr. Oppert edited his book; and that is the text in the possession of Dr. Râm Dâsa Sen of Berhampur (Bengal). The Eastern copyist or scholar in transferring the passage from Brihat Saṃhitâ to Sukraniti adapted the idea to the geographical conditions of his own country.

[3] *Brihat Saṃhitâ* LV, 12-13.

(*d*) *Hindu Phyto-pathology.*

The horticulturist, as we have seen, must know the principles of phyto-pathology and be competent enough to diagnose the diseases[1] of plants and find out the enemies of their proper growth. It is also one of his functions to treat the plants with proper medicines and help forward their natural growth and development. We have already noticed the four recipes of Sukrâchâryya. To these we may add the following four from *Brihat Saṃhitâ*; two of which are similar to those we know :

(1) To cure the tree of these diseases, first scrape off or otherwise remove the parts dead from the tree with a knife ; rub over the parts with a mixture of vidanga (Erycibe paniculata), ghee and mire, and pour at the roots water mixed with milk.[2]

(2) "If the fruits are seen to die out, then heat a mixture of horse gram, black gram and mudga, sesamum seeds and barley ; after the mixture has fully cooled pour it at the roots. Then the trees will yield increase of flowers and fruits." This is exactly one of the recipes of Sukra.[3] It is to be noted, however, that this is to be found in only one of the texts on which Mr. Oppert based his publication of Sukraniti. This text is that in the possession of Dr. Râmdâs Sen of Bengal.

(3) "Get two *âdhakas* of the excrement of the goat and the ram, an *âdhaka* of sesamum seed, half an *âdhaka* of *saktu*, an *âdhaka* of water, and a

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[1] According to Varâha "cold winds and hot sun produce diseases in trees, and the trees turn white and do not put forth new leaves ; the branches become dry, and the juice oozes out." LV, 14.

"The existence of blights and mildews of cereals had been observed and recorded in very ancient times, as witness the Bible, where half a dozen references to such scourges occur in the Old Testament alone. The epidemic nature of wheat rust was known to Aristotle about 350 B.C., and the Greeks and Romans knew these epidemics well, their philosophers having shrewd speculations as to causes, while the people had characteristic superstitions regarding them. Pliny knew that flies emerge from galls. The few records during the middle ages are borne out by what is known of famines and pestilences. Cf. Shakespeare's *King Lear*, Act III, Sc. iv." Encyclopaedia Britannica, 11th Edition, Vol.XXI. (Pathology of Plants).

The following letter to Major B. D. Basu from late Surgeon-General George Bidie, C.I.E. testifies to the practical knowledge of Indian cultivators in phyto-pathology even in modern times : "The achievement on which I place perhaps most value was the discovery of a remedy for the *coffee bores*, which threatened to ruin the coffee industry. The remedy was a simple one, *viz.*, cultivating the coffee under the shade of other trees which protects it from the insect. The native practice in their gardens led me on to this discovery in practical Zoology." (19th July, 1894. Perthshire N.B.)

[2] Brihat Saṃhitâ LV, 15.

[3] *Ibid* LV, 16. Cf. Śukra IV, iv, 107 108. The verse is the same in both treatises except in one or two unimportant words. We may believe rationally that the Bengal Pandit of old interpolated this verse from *Brihat Saṃhitâ* and made it a part of his MSS. of Sukranîti.

tula (100 palas) of cow's flesh. Form a mixture of these, keep it untouched for seven days, and if, at the end of the time, spreading creepers, plants and trees be watered with the mixture, flowers and fruits will grow in abundance."

This, again, is another of Sukra's methods.[1] The languages of the verse in *Sukra* and *Varâha* differ; but, except for the measurements (âdhaka, &c.) given in the latter, the two are substantially the same.

(4) Keep the seeds soaked in milk for 10 days; then rubbing ghee over the hands the seed shall be taken up in the hands and passed from hand to hand till it is covered with ghee. It shall then be rubbed over several times with cowdung and exposed to the smoke of the flesh of the hog and the deer. It shall then be mixed with the serum or marrow of the flesh of the fish and the pig, and when dry it shall be sown in a well-prepared soil and watered with a mixture of milk and water. When it grows, it will grow with flowers.

The similarity between Sukranîti and Brihat Saṃhitâ in the two recipes cannot be interpreted to indicate the priority of the one or the other until other evidences are available. If the Doctrine of Navagraha and Navaratna utilised in Sukranîti be the work of the same age that is responsible for the agri-flori-horti-arbori-cultural section, *Sukranîti* is certainly subsequent to *Brihat Saṃhitâ*, and the Sukra authors must have quoted and paraphrased the two recipes from Varâha or drawn upon the floating literature on the subject.

(*e*) *The Luther Burbank of Hindu India.*

Brihat Saṃhitâ is further interesting to us as giving the methods of producing some botanical wonders. Thus we read (1) how the tamarind and other trees can by proper treatment be made to grow up as creepers, (2) how a plant can be made to grow up full-fledged, like Minerva born *cap-à-pie*, with branches and fruits, (3) how a plant can grow and bear fruits in a day; and so on.

Mr. Chidambram Iyer, translator of *Brihat Saṃhitâ*, adds to the section on Gardening interesting notes derived from a work known as *Brihat Sâranga-dhara*. This work describes the horticultural processes by which (1) scentless flowers may become fragrant, (2) the cotton-plant will yield cotton throughout the year bright and red as fire, (3) trees will yield flowers at unusual seasons, (4) fruits will grow without bones, (5) fruits will ever remain unripe, (6) fruits will stick to the tree for a very long time; and so on.

The following miracles in horticulture are guaranteed by *Brihat Sârangadhara*.[2]

(1) If the root of the plantain tree be drenched with the blood or serum (of flesh) of the hog or with the decoction of the fruit of the ankola (alangium hexapetalum), it will bear pomegranate fruits.

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[1] Here again, it is only in the Bengal MSS. that we have this recipe. (cf. Sukra IV, iv, 110-112). It is to be easily surmised that the Eastern copyist or scholar incorporated the passage of Varâhamihira with his text of *Sukranîti* in order to make it more important as a manual of gardening, &c. In doing this he, however, does not quote *in toto*, but paraphrases the idea in his own language.

[2] Iyer's *Brihat Saṃhitâ*, Part II, pp. 59-66.

(2) If the plantain tree be watered with a liquid mixture consisting of the flesh, serum, and blood of men and the powdered tooth of elephant and water, the tree will yield mango fruits.

Mr. Edward Lee Greene[1] bears out such ideas of transmutation existing in the western world:

"In this 20th century of our era there are farmers in the world, and not unintelligent, who believe that to some seed of wheat or barley after it has been sown in the field something may happen by which it comes to sprout and grow up into a plant of what they call chess or cheat; a plant known to botanists as *Bromus secalinus*. * * * The seemingly indicative facts upon which this transmutation theory appears as if it might have established itself in the minds of pre-historic grain-growers were several. * * * Theophrastus does not formally and didactically discuss this question, though he makes a number of references to this changing of one plant into another as something universally believed in his day. * * * It was the metamorphosis attending the development of the individual reptile and the insect which helped to elevate to the dignity of a quasi-rational belief the superstition of the changeability of wheat into lolium."

If the complete transformation of orders and genera be absurd, that of species is not so and has been verified by experiments. With the horticultural miracles guaranteed by Varâhamihira and Brihat Sârangadhara of old we are tempted to compare the epoch-making new creations in plant-life by Burbank, the American plant-breeder of modern times, "which have added to the wealth of nations and enriched the dietary of the race, and have made the world more beautiful." The wonderful achievements of this great and unique genius include among other creations the following: the improved thornless and spineless edible cactus, food for man and beast, to be the reclamation of the deserts of the world; the primus berry, a union of rasp-berry and blackberry, *the first recorded instance of the creation of a new species*; a tree which grows more rapidly than any other tree ever known in the temperate zones of the world; a dahlia with its disagreeable odour driven out and in its place the odour of the magnolia blossom substituted; a chestnut tree which bears nuts in eighteen months from time of seed-planting.

Regarding the creation of new species Mr. Harwood in his authoritative account of the life and work of Luther Burbank writes: "Should a dweller upon some other planet where some other sun kisses its earth into life come down through space bearing a fruit as yet untasted by the world-men, it would not be more distinctive or more delicious to the taste, than the fruit which Mr. Burbank picked one summer day from a *tree which he had made from three other trees*. For the fruit which he picked was unlike any other fruit which had grown on the earth before—it was absolutely new, he had accomplished that which men had said was impossible. So it has been said on other occasions, - such and such things cannot be done. Mr. Burbank says wait; let us see about it.

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[1] *Landmarks of Botanical History* (Smithsonian Institution, U. S. A. 1906), pp. 135-140.

[2] See *New Creations in Plant-life* by Harwood (Macmillan & Co., 1905).

"He took a wild American plum, a Japanese plum, and an apricot. He bred these three together and made a third, the plumest, different in texture, colour and taste from any other fruit. * * * Indeed there are now opened in many lines of plant-life, by this demonstration of the feasibility of creating new species, possibilities whose scope is limitless."

It seems well nigh impossible to-day to venture describing with any precision the exact character of the new forms and improvements in plant-life that testified to the skill of the practical agriculturists and farmers of ancient India in breeding and selection.

(*f*) *Botany in Fine Arts.*

Sukra authors have not supplied us with much information about these and other branches of Economic Botany, as Râja Bhoja, the author of *Yukti-kalpataru* does. Nor do they refer to the treatment of vegetable motives in art.

Like the metals and animals of the country, the indigenous plants also have left their permanent impress upon Hindu art. The treatment of vegetables in sculpture has been thus remarked upon by Dr. Râjendralâl in *Indo-Aryans*: "The lotus, as may be expected from the circumstance of its being the most gorgeous and handsome flower in India, is by far the greatest favourite, and in Orissa, as elsewhere, occurs everywhere and in various forms—in bud, in a half-open state, and in full-blown flowers. In some specimens the attempt to delineate nature is very nearly successful, but a conventional form is what is generally adopted. * * * The attempt of the Orissan artist to represent vegetable forms will be readily acknowledged to have been much more successful than that of Egyptian and Assyrian sculptors. * * * The Uriya artists depended very largely on the beauty of their vegetable forms for the success of their works, and introduced them as primary, and not as accessory, ornaments in their architecture much more extensively than any other nation of antiquity."

Among the simplest objects of nature pressed into the artists' service in the Ajanta Paintings of the 5th-7th cent. A.D., Mr. Griffiths[1] mentions the "large pink lotus, full-bloom, half-bloom, and in bud, as well as the smaller red and white; the mango (*Mangifera indica*), custard-apple (*Anona squamosa*), a round fruit which may be called the bel (Marmelos ægle) or the lime (Citrus medica); another that looks like the brinjal (Solanum melóngina).

The following remarks regarding vegetable life in Hindu art are taken from Vincent Smith's *History of Fine Art in India and Ceylon*:[2] "The use of a long undulating stem, band, garland or roll to break up a long frieze into sections was familiar to Indian sculptors from early days. As seen on Bharhut coping, the device used is a lotus stem with jack fruits attached. * * * The introduction of the vine into Indian bas-reliefs used to be considered as in itself evidence of copying from Hellenistic models. But that view is not tenable. Sir George Watt believes that the plant is indigenous on the Lower Himalayan ranges, and is even inclined to think that its cultivation may have been diffused into Europe from that region. * * * The Indian aptitude for artistic representation of plant-life certainly was not learned from the Greeks, who could not teach the lesson. Sir George Watt points out to me that the pinnate foliage motives are distinctively Indian."

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[1] Quoted by Smith in *Hist. of Fine Art*, p. 280.

[2] *Ibid*, pp. 384, 386, 388.

Mr. Grunwedel[1] in his *Buddhist Art in India* bears the following testimony to the successful treatment of foliage by the Hindu craftsmen: "The Indian plant-world, notwithstanding simple and sometimes even rough modelling, is reproduced with astonishing fidelity to nature. * * * The Hindu sculptor does not care for purely geometrical designs, and so we find frequently creepers with aquatic birds, &c., which, on a smaller scale, fill in the spaces, and are rich and animated with fine observation of nature. * * * Birds flit about among the flowers; and the plant itself grows from the jaws of a sea-monster. * * * In the main, it may be said that these plants, represented in simple lines, with the native animals that animate them—both of which have received purely native modelling—mostly surpass what the celebrated Greek art was able to command: They rest upon a faithful observation of nature."

SECTION 6.

Agriculture.

(*a*) *Agricultural Occupation, Population, and Tenure*

The means of livelihood[2] enumerated in *Sukraniti* are : (1) learned professions—art of teaching, etc. (2) service, (3) heroism (soldier's art), (4) agriculture, (5) usury, (6) commerce—shop-keeping, (7) industries and arts, (8) begging.

Agriculture is one of the four subjects dealt with in the science of *Vârtâ*. "In Vârtâ are treated (1) interest, (2) agriculture, (3) commerce, and (4) preservation of cows. The man who is well up in Vârtâ need not be anxious for earnings." About the occupation of agriculture Sukrâchâryya's general idea is (1) that it is superior[3] to that of the Vaisyas, *i.e.*, commerce, and menial service of the Sûdras ; and (2) that it is too important to be left to a proxy.[4]

Even Brahmans[5] can take to agriculture according to Manu, says Sukrâchâryya.

Among the 64 *kalâs* we have only one connected with agriculture, *viz*. that of drawing the plough.[6] It would thus appear that agriculture was not probably regarded as a *kalâ*. Besides, it may be remarked that the country of Sukrâchâryya was not purely an agricultural one, but industrial as well.

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[1] English Edition (Bernard Quaritch, London, 1901), pp. 19-20.

[2] Sukra I, 311-12. The two sciences *Vârtâ* and *Dandaniti* together constitute *Arthasâstra* (a variety of Nitisâstra).

[3] Sukra III, 552-54.

[4] Sukra III, 583-84.

[5] Sukra III, 364-67.

[6] Sukra IV, iii, 37.

In agriculture-as in shop, keeping and other occupations, women are to be assistants of males.

Agriculture is also one of the occupations which should be patronised[1] by the state.

The equitable law of Sukra statesmen exempts agriculturists in the harvest seasons from liability to give evidence.[2] Another law with regard to the peasant class is that, like the artists, ascetics, &c., the cultivators should have their disputes decided "according to the usages of their guild,"[3] because "it is impossible to detect them through others' help." The truth and evidences are to be found out with the help of persons born of (*i.e.*, connected with) them. Sukra legislators have mentioned a third law relating to the peasants. This is about joint-stock enterprise which "applies equally to commerce and agriculture."[4] The law is stated below :

"Those who deal in gold, grains and liquids (collectively) will have earnings according to the amount of their share, greater, equal or less." We noticed this law in connexion with metals in a previous section.

It is to be noted that all these secular laws apply to the Mlechchhas[6] also, though they may follow "other masters" in religious beliefs and practices.

About agricultural tools and implements Sukraniti is not a good source of information. We have noticed the plough already. About agricultural livestock we have the following rule :[7]

Brâhmaṇas	should	have	16	cows	to their	ploughs.
Kṣatriyas	„	„	12	„	„	„
Vaisyas	„	„	8	„	„	„
Sudras	„	„	4	„	„	„
Antyajas	„	„	2	„	„	„

There are various kinds of soils with varying degrees of fertility and access to market. The Sukra financiers recognise the consequent variation in Agricultural Returns and have apportioned the Land Revenue in an equitable manner. The following land-laws are what we get about rents, revenues, tenures, &c., affecting the agricultural population of the country :

(1) The king should receive rent[9] from the peasant in such a way that he be not destroyed. It is to be realised in the fashion of the weaver of the garland who, in plucking flowers from plants, takes care that the stock be not exhausted, and not of the charcoal or fuel merchant who destroys the wood altogether.

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[1] Sukra IV, iv, 54.

[2] Sukra IV, iv, 85-87.

[3] Sukra IV, v, 206-207.

[4] Sukra IV, v, 35-37.

[5] Sukra IV, v, 618.

[6] Sukra IV, v, 614-17.

[7] Sukra IV, v, 585-87 ; IV, v, 74-77.

[8] Sukra IV, iii, 38-39.

[9] Sukra IV, ii, 222-23. See also Sukra I, 418-19, where the systems of land-measurement according to Manu and Prajâpati are compared. Cf. again Sukra II, 345-346.

(2) That agriculture[1] is successful which yields a profit twice the expenditure (including Government demand) after duly considering variations in actual produce.

(3) The king should realise[2] (*a*) one-third from places irrigated by tanks, canals and wells, (*b*) one-fourth from places irrigated by rains, (*c*) one-half from riparian soils, and (*d*) one-sixth from barren and rocky soils.

(4) If people[3] cultivate new lands and dig tanks, canals, wells, &c., for their good, the king should not demand anything of them till they have realised profit twice the expenditure.

(5) Income of the State from Land or Land Revenue is called *Pârthiva*[4] Income (terrestrial). This is various according to the sources, *e.g*, natural waters, artificial waters, villages, cities, &c.

(6) The king should give to each cultivator the deed of rent[5] having his own mark or seal.

(7) The apportionment and realisation[6] of land-revenue are to be managed in the following way:

(*a*) Having determined the land-revenue of the village the king should receive it from one rich man in advance, or accept a guarantee for the payment of that in monthly or periodical instalments;

(*b*) Or the king should appoint officers, called grâmapas, by paying one-sixteenth, one-twelfth, one-eighth of his own receipts.

(8) If necessary, the king should set apart lands and build houses for peasants.[7]

(9) It is one of the functions of the Sumantra[8] or Finance Minister to study the amounts of land, in cultivation, and out of cultivation, to know the realisers of rent and the amount realised, &c.

(*b*) *The Crops.*

In the preceding sketch we have given all that can be gleaned from *Sukranîti* about cultivation, irrigation, out-turns, Government demand and the agricultural class. We shall now proceed to notice the various plants that have been mentioned by the Sukra authors in the course of their work as distinguished from the fruit-bearing and thorny trees enumerated together, as well as their domestic, industrial or artistic uses which have been recorded in the treatise.

Grains are important like the noble metals, precious stones, &c., and should be hoarded in the treasury. It is one of the duties of the king to study the amounts with the chief of granaries for four[9] muhurtas before meals. These are important belongings of the state and require a department or an officer all to themselves. He is called *dhânyâdhipa.*[1] His function is to know[2] of the species, measurements, values, essential characteristics of the grains, as well as the methods of consuming, collecting and cleansing them. It is to be noted that winnowing of grains is a ***kalâ*** or an art, and those who practise it should be maintained by the state.[3]

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[1] Sukra IV, ii, 224-26.

[2] Sukra IV, ii, 227-30.

[3] Sukra IV, ii, 242-44.

[4] Sukra II, 668-70.

[5] Sukra I, 423-424.

[6] Sukra IV, ii, 247.

[7] Sukra IV, ii, 248-52.

[8] Sukra II, 207-10.

[9] Sukra I, 561-62. 1 Muhurta=48 minutes.

The following are the rules[4] for the collection and accumulation of grains and provisions:

(1) They should be sufficient to meet the wants of three years, or more.

(2) Only those grains are to be stored up which are well-developed, bright, best of the species, dry, new, or have good colour, smell and taste, the famous ones, durable and dear.

(3) Those grains which have been attacked by poisons, fire or snows (hima) or eaten by worms and insects or those that have been sucked hollow should be used for immediate consumption and not laid by for future use.

(4) Every year there should be new instalments to replace those that have been consumed.

It is evident that the superintendent of the granary is to have such qualifications as will enable him to help the king in discriminating the good ones from the worthless. Like the superintendents of metals and gems who are to be well up in Economic Mineralogy, the officers of the granaries are to be proficient in those branches of Economic Botany which deal with the food-grains, cereals, domestic crops, &c., especially with regard to their life-history, diseases, enemies, &c.

It is to be understood that the grains are stored up not only for ordinary uses in the royal household, but also for the commissariat in times of war. "The king should have forts[5] well-provided with war materials, as well as grains, &c." We have already noticed the importance Sukrâchâryya attaches to grains in warfare.[6] "From the manœuvre of âsana or besieging, the king should destroy carefully those people who help the enemy by carrying wood, water and provisions; and subjugate the enemy through protracted processes by which provisions are cut short, food and fuel are diminished and the subjects are oppressed." We read also: "The powerful should coerce[7] the enemy by stopping the supplies of water, provisions, fodder, grass, &c., in an unfavourable region and then extirpate it."

Besides these references to grains in connexion with the state treasury, royal household, and military operations, there are others which relate to economic interests of people. Thus we have the ruling about joint stock enterprise[8] in grains, as in metals, &c. Again, like the man who counterfeits coins, the man who destroys grains is said to commit an offence that is called

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[1] Sukra II, 239.
[2] Sukra II, 313-14.
[3] Sukra II, 408-9.
[4] Sukra IV, ii, 50-59.
[5] Sukra IV, vi, 23-24.
[6] Sukra IV, vii, 570-73.
[7] Sukra IV, vii, 710-41.
[8] Sukra IV, v, 614-18.

Râjajneya or cognisable by the state as against itself, even without any plaintiff. This is one of the 22 cases[1] enumerated by Sukrâchâryya as coming under *crown* vs. *defendants*.

i. The Cereals.

(*a*) *Vrîhi.*

Vrîhi (*oryza sativa*)[2] is used in rubbing the oyster-pearl soaked in hot saline water during a whole night in order to test if it is genuine or one of the artificial commodities, *e.g.*, those manufactured by the people of Ceylon. Rice[3] is one of the ingredients used in determining the guilt of an offender by *Divya sâdhana*, or divine test. The man has to chew without anxiety or fear one *karṣa* amount of rice. The rice-ordeal would declare a man guilty who in chewing the rice experiences difficulties, through palpitation of heart or want of salivation. This ordeal is to be applied in a case involving theft of Rs. 125.[4] There is a law also that the king should not receive milk of cows, &c., for his kith and kin, nor paddy[5] and clothes from buyers for his own enjoyment.

(*b*) *Godhuma.*

Wheat (*Triticum vulgare*) has been mentioned only once. The iron-sheet of which the *kavacha* or armour has to be made should have the thickness of a grain of wheat.[6] "This cereal[7] is essentially a crop of the warmer and drier parts of the temperate zone; but its limits of growth are wide, its varieties being adapted to nearly all climates. In India it is always grown in the cold weather, most extensively in the north and hardly at all in the south."

In Prof. Guha's Bengali translation of Greek *Fragments* of Megasthenes we read of Strabo quoting from Eratosthenes to enumerate some of the cereals and pulses of India sown in the rainy season and winter, and remark that wheat, barley and other crops are unknown to the Greeks (Strabo, XV. i, 13.)

Mr. Schoff thinks (p. 76) that wheat was introduced into India from Egypt. But according to Mr. Jayaswal, the evidence of language is against this view. It came from Persia, or from Mesopotamia (one of its wild homes) through Persia. Its name in India (*Godhuma*) is identical with that in Persia (*Gandum*). Wheat does not figure in Hindu ceremonials, where barley flour and grains are employed. The former is certainly a late introduction.

Mr. Schoff's view was started by Candolle in his "Origin of Cultivated Plants." The section on Habitat and History of wheat in Watt's *Dictionary of Economic Products*, Vol. VI, Part IV (p. 90-91), summarises Candolle's remarks. The Editor's remarks are also very valuable: "There is thus very nearly as strong presumptive evidence in favour of India being the home of some of the forms of wheat as can be shown for any other part of the globe. * * * India possesses perhaps as comprehensive a series of time-honoured forms of wheat as can be shown for any other country. Most of these have been grown for countless ages on very nearly the same fields as they are to be found at the present day."

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[1] Sukra IV, v, 165-166.

[2] Sukra IV, ii, 126-128.

[3] Sukra IV, v, 470-71, 483.

[4] Sukra IV, v, 487-90.

[5] Sukra IV, ii, 253-54. The reader is requested to read the translation of these lines as given here on p. 149 of Vol. XIII of the *Sacred Books of the Hindus Series.*

[6] Sukra IV, vii, 432-33.

[7] *Indian Empire* in the Imperial Gazetteer of India. Vol. III. p. 29.

(*c*) *Yava.*

Yava or barley (*Hordeum vulgare*) is the third cereal mentioned in *Sukraniti.* It constitutes one of the best articles[1] of horses' food. It is also one of the substances which are to be cooked with water for application to trees whose fruits wither up through disease.[2] The powder of *yava* should be kept together with other grains and beef as well as water for seven nights. The application of this water also conduces to the growth of trees in flowers and fruits.[3]

(*d*) *Pulses.*

The pulses have been mentioned by the Sukra authors in connexion with the food of horses. Thus we read that barley and *chaṇaka*[4] (gram or *Cicer arietinum*) constitute the best food for horses; *maṣa* (black gram or *Phaseolus radiatus*) and *makuṣtha* (*Phaseolus acontifolius* or kidney bean) constitute second class food; and *masura* (lentil or *Lens esculenta*) and *mudga* (green gram or *Phaseolus mungo*) are inferior stuff.

Besides these five pulses, we have *harimantha*[5] (peas or *Pisum sativum*) in the following line. : "The horse should be given *harimanthas*, *mâṣas* and *makuṣthas*, both dry and wet, as well as cooked meat."

The seventh pulse mentioned in Sukraniti is *kulutha*[6] (horse gram or *Dolichos biflorus*). Like barley, it is one of the substances used in the preparation of the manure that operates against the tendency of trees to have their fruits withered up, and promotes the growth of healthy flowers and fruits. The other pulses which may also be thus used are *Phaseolus radiatus* and *Phaseolus mungo.*

(*e*) *No Saktu.*

Saktu has been mentioned also as a food for horses.[7] "The horse should, after work, be fed upon sugar and Saktu mixed with water." Also, "the horse should be made to take milk, ghee, water and *saktu.*" This Saktu is powdered preparation of *Cicer arietinum* and other pulses or hordeum vulgare, &c.

One other pulse has been referred to. That is *niṣpâpa* (*Dolichos lablab*). The two nostrils of an image are to be beautiful like the *niṣpâpa*[8] legume.

(*f*) *Oil-seeds.*

White mustard seeds[9] have been mentioned as representing one of the many shapes of feather-rings which are auspicious marks of horses.

One of the 64 *kalâs* is the extraction of oil from seeds.[10] We are not told which seeds. The use of oil for the body is referred to in the following : "The man who appears before the king in the act of rubbing oil[11] commits the offence called *chhala.*

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[1] Sukra IV, vii, 285.

[2] Sukra IV, iv, 107-108.

[3] Sukra IV, iv, 110-112.

[4] Sukra IV, vii, 285-86.

[5] Sukra IV, vii, 272-73.

[6] Sukra IV, iv, 107.

[7] Sukra IV, vii, 270-71, 282.

[8] Sukra IV, iv, 224.

[9] Sukra IV, vii, 159-161.

[10] Sukra IV, iii, 187.

[11] Sukra IV, v, 155-156.

(*g*) *Tila*

Tila[1] (*Sesamum indicum*) is, like the cereal *yava* and the pulses, phaseolus radiatus, and phaseolus mungo, and dolichos biflorus, an ingredient to be used for the preparation that conduces to the growth of trees in flowers and fruits. It may be used in two ways either (1) by being cooked or (2) by being powdered and mixed with beef, cold water, &c., and kept undisturbed for seven days and nights. The flower of the plant is very straight ; and the nose of images[2] is to be like it, if straight, or like the bill of birds, if curved.

The following interesting note is taken from Birdwood's *Handbook to the Indian*[3] *Court* at the Paris Universal Exhibition of 1878: "The phrase *Open Sesame* is from the Indian oil seed, *til*, or *sesamum indicum*, the cultivation of which was carried in the earliest ages into Mesopotamia and Egypt, where it became known under the name of *Semsen* ; and 'open Sesame ! ' is equivalent to 'Bring in the candles,' 'Light the gas' ; bring light, which opens everything, which neither wheat nor barley could give Cassim, but only the oil seed Sesamum."

Mustard (*Brassica campestris*) has been referred to as the specimen of very small substances. "To the good man even a very insignificant benefit rendered appears very high, while the wicked man considers a service even less in amount than a mustard seed to be huge."[4]

ii. Other Plants.

(*a*) *Sugarcanes.*

Sugarcanes[5] (*Saccharum officinarum*) are the plants which give rise to one of the sixty-four *kalâs.* The following is taken from Birdwood's *Paris Exhibition*[6] (1878): "Sugar was introduced into Europe by the Saracens and through the Crusades. * * * All the European names for Sugar are derived from Sanskrit *Sharkara*, through the Arabic *Shakar*, the Hindu name of sugar. * * * Undoubtedly sugar was made from time immemorial in India. * * Nearchus quoted by Strabo (XV. 1, 20) says that in India 'reeds yield honey, although there are no bees.'

(*b*) *Bamboos.*

Bamboos[7] (Dendrocalamus strictus) also give rise to a *kalâ*—the preparation of vessels with leaves and straws of the plant. Bamboos are known to be one of the sources of pearls.[8] It is also stated that the king should win over the forest tribes to his side, and be like bamboos[9] surrounded by clusters of thick thorny trees.

(*c*) *Tula or Cotton.*

Cotton (*Gossypium herbaceum*) has been referred to twice to serve the purpose of analogies for light insignificant substances. "The untrained, inefficient and raw recruits are like bales of cotton.[10] The wise should appoint them to other tasks besides warfare." Again, "The king cannot be restrained by the councillors, for they are his servants, just as the elephant cannot be bound by thousands of bales of cotton."[11]

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[1] Sukra IV, iv, 107-108, 110-112.

[2] Sukra IV, iv, 223.

[3] P. 24.

[4] Sukra III, 619-20.

[5] See pp. 31-33, for the interesting history of sugar in both East and West.

[6] Sukra IV, iii, 146.

[7] Sukra IV, iii, 190.

[8] Sukra IV, ii, 117-18.

[9] Sukra IV, vii, 482-85.

[10] Sukra IV, vii, 356-357.

[11] Sukra IV, vii, 832-833.

Mr. Schoff in his newly published edition of the *Periplus* (Pp. 71-76) adds the following note :

> "Sansrkit, kârpâsa; Hebrew, carpas; Greek, karpasos ; Latin, carbasus—the seed-fibres of Gossypium herbaceum and G. arboreum (order, Malvaceæ) native in India, and woven into cloth by the natives of that country before the dawn of history. The facts concerning it have been admirably stated by Mr. R. B. Handy in *The Cotton Plant*, a report of the U. S. Department of Agriculture, issued in 1896. Cotton thread and cloth are repeatedly mentioned in the laws of Manu, 800 B.C. Professor A. H. Sayce in his Hibbert Lectures shows ground for the belief that it was exported by sea to the head of the Persian Gulf in the 4th Millennium B.C. ; and it found its way very early to Egypt. Herodotus describes it as a wool, better than that of sheep, the fruit of trees growing wild in India.
>
> " The manufacture of cotton cloth was at its best in India until very recent times, and the fine Indian muslins were in great demand and commanded high prices, both in the Roman Empire and in Mediæval Europe. The industry was one of the main factors in the wealth of ancient India, and the transfer of that industry to England and the United States, and the cheapening of the process by mechanical ginning, spinning and weaving, is perhaps the greatest single factor in the economic history of our own time."

In Prof. Rajanikânta Guha's Bengali translation of the original Greek *Fragments* of Megasthenes we read of Eratosthenes referring to wool yielded by a kind of tree. Prof. Guha also mentions Herodotus as having noted this fact, and remarks that this undoubtedly points to kârpâsa or cotton plant.

Prof. Mookerji quotes from the eighth volume of *Nihon-ko-ki* and 199th Chapter of *Ruijukokushi*, two Japanese State records, to prove that about 799-800 A.D., "Cotton was introduced into Japan through the Indians who were unfortunately carried over to that country by the black current." *Indian Shipping*, p. 174.

(*d*) *Arka.*

Besides cotton, another fibre-plant has been noticed. This is arka (*Calotropis gigantea*), but its use in *Sukranîti* is for a quite different purpose.[1]

The Calotropis gigantea, the Euphorbia neriifolia, Allium sativum, Indigofera tinctoria, and Pinus longifolia have been mentioned as plants useful in the manufacture of gunpowder, [2] as supplying both charcoal and juice. We have already described the recipes in the section on minerals.

(*e*) *Indigo.*

The antiquity of Indian Indigo can be inferred from the following lines in the *History of Indian Shipping* (p. 91) : " Further, according to Wilkinson, the presence of indigo, tamarind wood, &c., has been detected in the tombs of Egypt, and Lassel has also pointed out that the Egyptians dyed cloth with indigo."

(*f*) *Betel.*

Among narcotic plants we have betel (*Piper betle*) and *gânjâ* (*Cannabis sativa*). The preparation and preservation of betels constitute one of the sixty-four *kalâs.*[3] Men skilled in the preparation of betels[4] have been mentioned among the artists and artisans who should be encouraged by the king.

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[1] Sukra IV, vii, 400-415.

[2] Sukra IV, iii, 198.

[3] Sukra II, 410-11.

[4] See Birdwood's *Paris Universal Exhibition*, p. 23.

One of the *chhalas* or offences against social etiquette is known to be the act of taking or chewing betel,[1] before being presented with it by others.

Betel-leaf has ever been an important item in the socio-economic life of South India. We have seen the trade in betel mentioned by ***Periplus.*** An inscription[2] bearing on mediæval Chola life (800-1100) records: "The great men elected for the supervision of the tanks shall be entitled to levy a fine of one Kalanju of gold in favour of the tank-fund, from those betel-leaf sellers in this village, who sell betel-leaf elsewhere but at the temple of Pidari."

(*g*) *Gânjâ.*

The *gânjâ* house has been mentioned as a generic term for taverns and resorts of people who take to spirituous liquors, intoxicants, narcotic drugs, &c. "The king should build the *gânjâ* house[3] outside the village and there keep the drunkards, and should never allow drinking of liquor in his kingdom in the day time."

No intoxicant plant has been referred to in the *Sukranîti* as such, but we have noticed in a previous section that Cocos nucifera, Phœnix sylvestris, &c., are such liquor-yielding plants. Tobacco (Nicotiana tabacum), Poppy (Papaper somniferum), &c., have not been mentioned.

(*h*) *Lotus.*

Lotus or *Nelumbium speciosum* is the plant whose flowers are the favourite resorts of bees. "The bee that has the power of cutting holes and can fly with wings, gets, however, caught within a lotus,[4] because of its desire for smell." Lotuses,[5] when newly blossomed, are favourites of the moon also. Lotus is one of the things in the hands of *Viṣṇu.* "The *sâttwika* form of Viṣṇu's image is to have hands indicating blessings and courage, and possessing conch and lotus."[6] The lotus is sacred also to the gods, Sun and Gaṇesa.

(*i*) *Citron*

Mâtulunguka or citron (*Citrus medica*) is the plant which, like lotus, is sacred to the gods.[7] A fruit of this plant is to be placed in one of the four hands of Lakṣmi.[8]

(*j*) *Rati* (Abrus precatorius).

Kṣumâ[9] and *rati* are seeds important in measurement of metals, precious stones, &c. The standards of weights and measurements will be treated of at length in a subsequent chapter.

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[1] Sukra IV, v, 153-154.

[2] Aiyangar's *Ancient India* p. 161.

[3] Sukra IV, iv, 89-90.

[4] Sukra I, 211-212.

[5] Sukra I, 323-324.

[6] Sukra IV, iv, 296, 301-302, 275-278, 298-99.

[7] Sukra IV, iv, 275-278.

Sukra IV, iv, 300.

[9] Sukra IV, ii, 130-144

SECTION 7.

Botany as Science.

Elementary notions of Theoretical Botany are to be met with here and there. Thus we are taught that "inferiority and superiority[1] depend sometimes on the qualities of the seed, sometimes on the character of the field. But excellence is due to both." This is all that we have of *abstract* Ecology.

According to size and shape we have the following classes of plants, besides trees :

(1) *Latâh,*[2] which do not flourish without resting grounds.
(2) *Stambinyah*[3] or bushes.
(3) *Gulminyah.*[4]

The trees are (1) thorny and (2) fruit-bearing ;[5] or (1) wild and (2) domestic. This is the sole Dendrology of the Sukra authors.

All the seven parts of a plant are known and have been mentioned in the right scientific order, *e. g.*, root, stem, branches, leaves, flowers, fruits and seeds. Thus "the king is the root of the state, the councillors are the stems or trunks, the commanders are the branches. The troops are the leaves and flowers ; the subjects are fruits, and the lands are seeds." Of course the fanciful analogy between the vegetable organism and the political organism is to be taken for what it is worth. It has its parallel in the fictitious analogies drawn between the body politic and other organisms by mediæval political thinkers of Europe.

The importance of the root in the life-scheme of the plant is thus indicated : "Just as the branches of a tree wither up when its roots[7] decay, so also without the king, the commanders, &c., grow powerless immediately or in course of some time."

Sukra statesmen know of only one form of political organism—the monarchical. And therefore the loss or absence of the king means a decay, if not complete revolution, of the kingdom.

The root has occupied an important place in the history of Botany in the west also.

"Throughout the whole period of Greek antiquity[1] there was a class of men who followed as a regular business the gathering, preparing and selling of roots and herbs that were of repute in medicine. * * * It was the example of the rhizotomists, in their books of plant-description extant in the times of Aristotle and Theophrastus, that impelled Theophrastus and others after him to give the form, texture, colour, odour, flavour, as well as the active properties, when these were known, of the roots or underground part of almost every

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[1] Sukra IV, iv, 78-79.
[2] Sukra I, 767.
[3] Sukra IV, iv, 123.
[4] Sukra IV, iv, 123.
[5] Sukra IV, iv, 91 93.
[6] Sukra V, 21-26.
[7] Sukra V, 22-3.
[8] Greene's *Landmarks of Botanical History*, pp. 48-51.

*plant. * * From Dioscorides and Pliny down through the middle ages and* out to near the end of the seventeenth century authors in general described and figured the roots of every weed and grass and bush and tree. * * * It was Valerius Cordus, the greatest if not the only botanical genius of the first half of the 16th century, who first gave expression to the opinion, that, from the morphologic and phytographic point of view, the importance of the root had always been over-estimated. He set the example for a reform of descriptive botany in this particular; but, as usual with men of genius, he was a century in advance of the ideas of the multitude."

SECTION 8.

A Preliminary Survey of Hindu Botany.

1. *Lines of inquiry.*

The data of ancient Indian Botany from the Nitisâstra of Sukrâchâryya have supplied us with information regarding the knowledge of the Hindus in several branches of Economic, Utilitarian or Applied Botany, *e.g.*, Sylviculture, Horticulture and Agriculture. The authors of the Sukra cycle have mentioned also the botanical *Kalâs* or vegetable arts and industries auxiliary to Ayurveda, the Science of Medicine, but have not otherwise devoted much attention to the Medical branch of Economic Botany. We have noted likewise that for Theoretical Botany or Botany as an abstract science, Sukraniti furnishes very few materials and has thrown out only vague hints here and there. This is inevitable, since the subject of plants and plant-life touches the province of Nitisâstras solely from the utilitarian stand-point.

If we take "the most extended use of the term, all information about the plant-world or any part of it is Botany.[1] According to this view, all treatises upon agriculture, horticulture, floriculture, forestry, pharmacy, in so far as they deal with plants and their products, are botanical." All earlier historians[2] of Botany in Europe have proceeded to their work on the theory "that for the earliest intimations of anything looking in the direction of the science of botany we must have recourse to those oldest pieces of literature in which plants are more or less freely mentioned. Adanson, for example, does not begin botanical history without naming Orpheus, Musa, Solomon, Hesiod, Homer, Metrodorus, and Hippocrates, who as poets or physicians wrote of plants. Sprengel has among his initial chapters one bearing the title 'flora Biblica,' another 'flora Homerica,' another 'flora Hippocratica.'"

The historian of Hindu Botany may, therefore, safely look upon Vedic Literature, Charaka Samhitâ, the Aṣṭâdhyâyi of Pâṇini, the Râmâyanam, the Mahâbhâratam, the Jâtakas, the Purânas, the Tantras, the scientific works of the schools of grammar, astronomy, medicine, and lexicon, the poetical works of Bhâsa, Kâlidâsa and others, the Nitisâstras, and other treatises of Sanskrit

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[1] *Landmarks of Botanical History*, Part I. By Edward Lee Greene (Published by the Smithsonian Institution, U. S. A. 1909) Preface p. 7.

[2] *Ibid.* Chapter I. p. 20.

literature as important landmarks in the history of knowledge regarding plants, and give to some of his chapters such titles as 'flora Vedic,' 'flora Charakensis' 'flora Malwica,' 'flora Sukrensis,' and so on

Botany, *as a science*, however, must rigidly demarcate itself from such utilitarian or poetic treatment of plants, but occupy itself with the "contemplation[1] of plant as related to plant and with the whole vegetable kingdom as viewed *philosophically* in its relation to the mineral on the one hand, and to the animal on the other." Such purely botanical studies *i.e*, abstract researches regarding plants *as plants* rather than as things useful or deleterious to man and beast, are pre-eminently modern. This would be evident from the following extracts from the articles bearing on the history and evolution of the science in *Encyclopaedia Britannica*:[2]

"Little, however, was done in the science of Botany, properly so called, until the 16th century of the Christian era, when the revival of learning dispelled the darkness which had long hung over Europe. * * * The descriptions in these early speculations were encumbered with much medicinal detail, including speculations as to the virtues of plants. Plants which were strikingly alike were placed together, but there was at first little attempt at systematic classification. * * * The foundation of botanic gardens during the 16th and 17th centuries did much in the way of advancing botany. They were at first appropriated to the cultivation of medicinal plants. This was specially the case at the Universities where medical schools existed. * * * Robert Brown (1773-1858) was the first British botanist to support and advocate the natural system of classification. * * * The study of plant anatomy was begun in the middle of the 17th century as a direct result of the construction of microscopes. * * * The subject was practically dormant for nearly a century and a half: it was revived by several German workers * * * at the beginning of the 19th century. * * * The pioneer of modern plant anatomy was Hugo von Mohl (1840). * * * In its systematised form, as a branch of botanical study, Phytopathology is of recent date; and, as now understood, the subject first received special attention about 1850, when the nature of parasitism began to be intelligible.[3]

"One of the earliest workers at Plant Physiology[4] was Hales (1727). * * * The birth of Modern Chemistry in the work of Priestley and Lavoisier, at the close of the 18th century, made possible the scientific study of Plant-nutrition * * * The department of geographical Botany made rapid advance by means of various scientific expeditions which have been sent to all quarters of the globe, as well as by individual effort since the time of Humboldt."

The above extracts regarding Systematic, Physiological, Geographical and Anatomical branches of Botany,[1] considered as an abstract science, show the essentially modern character of this division of human learning. Botany, as we have it to-day, is in reality only as old as the second decade of the last century. In comparing botanical ideas of the Hindus with those of the western peoples we cannot, therefore, too carefully remember the fact that these are embodied in Sanskrit treatises which are mostly several centuries older than even the crude beginnings of European scientific thought due to the Renaissance of the 16th century.

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[1] Ibid. Preface. p. 7.

[2] 11th Edition Vol. 4, p. 299.

[3] Vol. XXI, pp. 743-5, 754.

[4] Vol. IV, p. 202.

Whatever be the value of Hindu botanical theories, they are well worth the attention of the historian of botanical science for a proper estimate of the mile-stones in the culture-history of mankind. The data of botany *as science* from Hindu literature would thus supply some of the missing links in the concatenation of diverse facts and ideas that go to make up the complex web of human civilisation.

We have noticed above that in Europe botany began and grew as the handmaid of, and in subordination to, the science of medicine. The story is repeated in India also. The botanical literature of the Hindus is mainly pharmacopical, and essentially utilitarian or economic, at times poetical, scarcely *scientific.* And yet it is possible to glean from the vast mass of literature on industrial or applied botany and horticultural recipes the really scientific conceptions of the Hindus regarding (1) Vegetative organography, (2) Anthology, (3) Fruit and seed, (4) Anatomy, (5) Phytography, (6) Taxonomy, (7) Nomenclature, (8) Ecology, and (9) Dendrology.

Thus, according to Greene, "there are certain rudiments of a *science* of botany in those ancient pieces of literature, the real substance of which those authors of botanical commentary on the Bible, on Homer, on Virgil, and the classics generally, have completely overlooked. Let me repeat it that in several pieces of very old literature there are legible traces of a science of botany."[2] For, consciously or unconsciously, scientific botany must be as old as human history, and as extensive as the races of men. The records of antiquity[3] as well as of the most untaught people of modern times afford abundant proof of the existence of organology of plants, systematic botany &c.

By laborious researches into the botanical literature of antiquity, Mr. Greene has traced the evolution of Scientific Botany through the usages and rites of the *rhizotomi* or root-gatherers to the *Historia Plantarum* of Theophrastus (B. C. 370-286) whom he holds up as the "maker of the first landmark in the history of Botany," and "the discoverer and first promulgator of the elements of universal botany."

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[1] See also the English Edition of *History of Botany* (1530-1860) by Prof. Sachs of Wurzburg (Clarendon Press, Oxford 1890). Book I. History of Morphology and Classification, pp. 3-13 ; Book II. History of Vegetable Anatomy pp. 219-229 ; and Book III. History of Vegetable physiology, pp. 359-76. Greene's *Landmarks* (Part I) is a study of certain epochs in the Development of the Science of Botany prior to 1562.

[2] *Landmarks*, pp. 20-21.

[3] See Greene's *Landmarks*, pp. 21-43 for evidences.

It may be possible, by following the self-same method in the investigation of the botanical documents of Indian literature, to bring out the contributions of the ancient Hindus to the universal scientific botany of to-day. And probably Greene's remark[1] about Theophrastus may have to be applied with equal Cogency to charaka and other founders of the schools of medicine in the Pre-Buddhistic and Buddhistic ages of Indian history (6th cent. B. C.) :—

> "To me it seems not improbable that historians of the future, learning to know this great founder's mind better than is yet known, may agree in some judgment not unlike this: that all that has been added to the understanding of Plant life and form—to morphology, anatomy, physiology, perhaps even to taxonomy—within the last three centuries—has been due to the inventions of the opticians, and to the increased number of students and investigators, rather than to the appearing on the botanical horizon, within the modern period, of any one mind in powers of observation, penetration, and sagacity superior to Theophrastus of Eresus."

2. *The so-called "Indian Botany" of to-day.*

To do for ancient Hindu sages what Mr. Greene has done for Theophrastus would require (1) a knowledge of the fundamental principles of modern scientific Botany, and (2) a thorough familiarity with the several branches and landmarks of Indian Literature. Unfortunately, the trend of University Education in modern India has been to absorb the whole attention of the student-folk in mastering the technicalities of a foreign tongue; and, while it has deprived them of sound scholarship in oriental subjects, it has not equipped them with genuine mastery in any modern European science. And so far as Botany is concerned, it has until recently been grossly neglected, whether in its theoretical or economic and applied branches. The result has been a complete absence of interest on the part of Indians in things Botanical, abstract or utilitarian, modern or ancient.

When Europeans began to study the plants of India, they did not naturally care to inquire into the traditions of Hindu Botany and could not at all be interested in developing what the children of the Indian soil had achieved in this department of learning in the days of yore. They came out to India as medical men, botanists, or foresters and industrialists, and found in India a rich field for applying or correcting and modifying the systematic and ecological ideas that obtained currency in Europe of the later 18th and early 19th centuries. India was to them a laboratory that supplied novel and interesting data for the inductive generalisations of a science that had been developing in Europe from Theophrastus to Linnaeus. The Botanical investigations of these Europeans in India were thus new contributions to the already growing fund of European Botany and flourished absolutely independent of what the ancient Hindu masters might have observed and recorded, preserved and developed till the days of the Maratha hegemony.

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[1] To those who would take up the historical investigation into the really scientific contributions of the Hindus in the field of Abstract Botany, the chapter on *Theophrastus* in Greene's *Landmarks* is invaluable as suggesting not only the methodology, but also the lines of inquiry that would be required to bring into forefront the hitherto neglected pioneers of science. It is remarkable that Theophrastus, whom Greene elevates to the dignity of "Father of Botany" in 1909, was only casually noticed by Dr. Sachs in his celebrated History of Botany, published in 1875, which the translator for Clarendon Press, Oxford, regarded as a "masterly sketch" even in 1890.

The terms "Indian Botany" and "Indian Forestry" are thus really misnomers, for they do not indicate anything beyond the fact that the rich flora lying within the geographical limits of India have been identified, named, registered, tabulated and described, botanically or economically, according to the terminology, nomenclature and taxonomy of a science that was then passing through its infantile stages. The sole interest of the pioneers of the so-called "Indian Botany" was identification and botanical description of the vegetable denizens of India in the interest of European science, industry and commerce.

In 1790 Sir William Jones, founder and first President of the Asiatic Society of Bengal, gave a discourse on the medicinal plants of India in which he clearly indicated the lines of work that should be followed by botanical explorers and writers:—"Some hundreds of plants, which are yet imperfectly known to European Botanists, and with the virtues of which they are wholly unacquainted, grow wild on the plains and in the forests of India. The *Amara-koṣa*, an excellent vocabulary of the Sanskrit language, contains in one chapter the names of about three hundred medicinal vegetables; the *Medini* may comprise many more; and the *Dravyābhidhāna* or Dictionary of natural productions, includes, I believe, a far greater number; the properties of which are distinctly related in medical tracts of approved authority. Now the first step, in compiling a treatise on the plants of India, should be to write their true names in *Roman* letters, according to their most accurate orthography, and in *Sanscrit*, preferably to any vulgar dialect; because a learned language is fixed in books, while popular idioms are in constant fluctuation, and will not perhaps be understood a century hence by the inhabitants of these Indian territories whom future botanists may consult on the common appellations of trees and flowers."[1]

The founder of the first oriental research society in India was naturally anxious to do spade-work[2] for enriching European art, industry and science. Exactly similar were the motive and enthusiasm that inspired the *Flora Indica* (1855), the monumental work on Indian Botany, prepared at Kew, under the direction of Dr. Hooker, at the chief cost of the Secretary of State for India.

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[1] *Asiatic Researches*, Vol. II. XXII. pp. 270-271.

[2] Another such modern misnomer is *Indian Economics*, a term which does not seem to mean anything beyond the description and cataloguing of the present day economic resources and organisations of the country.

*In 1874 Mr. C. B. Clarke, in the Preface to the Reprint of Roxburgh's pioneer-*work[1] on Indian Plants, describes the merits of Hooker's labours which were directed mainly to a proper identification and cataloguing. " The Kew Indian Flora is of the highest value to Botanists, it tells those in India what material there is at Kew and *how the names are arranged*[2] there. And it will, when finished, form the foundation on which all future botanic work in India will be grounded. After the plants have been botanically *determined* and the *names attached, so that we are tolerably sure in general that we all mean by the same name the same thing,* we may commence economic and other branches of investigation with advantage. Drs. Hooker and Thomson have rightly urged that the Botanical determination of the plants must come first before any satisfactory progress elsewhere can be made ; and Indian Botanists have been right for generations in concentrating and narrowing their work in the manner that Drs. Hooker and Thomson indicated."

Identification and Determination of Indian Plants were thus the principal objects of the founders of the so-called " Indian Botany." There were some investigators who were not content with mere cataloguing and botanising, but added to these a study of the economic uses of Plants, as medical drugs or otherwise. Thus, to quote Mr. C. B. Clarke again, " Roxburgh contains all the economic Indian botany known to him. * * * Roxburgh is most trustworthy in his economic botany. * * * The Government of India but a few years back, called on Mr. Kurz to draw up a Forest Hand Flora for Burma which should comprise (among other things) a classified account of the different sets of forests, with all the trees in each, and the plants that usually accompanied each : an account of the method and habit of growth of each tree, and an account of the quality of the wood of each, and a special account of all the species likely to prove of economic value."

In his paper[3] on the study of indigenous drugs, Surgeon-Captain (now Major) B. D. Basu, I. M. S. gave an account of the work of scholars in the medical department of the economic aspects of Indian Plants from the establishment of the Asiatic Society of Bengal to 1891. " In the beginning of this century John Fleming contributed a valuable paper on the medical plants of this country. For the first time the scattered information on the subject was collected and placed before the medical profession. * * * Dr. Waring, who edited the Indian Pharmacopoeia,[4] was one of the most painstaking and careful observers of the properties and uses of indigenous drugs. His attention was drawn to the subject when serving out in Burma. The stock of his European medicines having been exhausted, he was in great perplexity and hardly knew what to do. In such a crisis, he turned to the medicinal plants of the country. He found indigenous drugs to answer his purpose as satisfactorily as the costly imported medicines of Europe."

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[1] Roxburgh's *Flora Indica* was published in 1832.

[2] The Italics are ours.

[3] *Indian Medical Gazette*, August, 1892.

[4] Published under the authority of the Secretary of State for India " with the view of bringing to the notice of the profession in India those indigenous drugs which European experience has proved to possess value as medicinal agents, and which may be employed as efficient substitutes for imported articles."

Enough has been said to show that, during the period from the last two decades of the 18th century, the sole aim of botanical researches in India has been

(1) to study scientifically or economically the vegetation of the Indian continent, according to the accepted doctrines of contemporary European thinkers;

(2) to look upon India solely as a vast herbarium supplying specimens for the scholars in the western world; and

(3) to ransack or exploit Indian vegetation in the interest of a foreign industry, commerce and science.

There has been no attempt

(1) to take stock of the existing Hindu literature on the subject of plants, whether *as plants*, or as drugs and useful commodities, or

(2) to maintain and continue the studies of the ancient and mediaeval scholars of India (whether scientific or utilitarian), and develop the intellectual heritage bequeathed by them to posterity. Thus, during the period which has witnessed the growth of Botanical sciences, arts and industries from the insignificant juvenile condition (which was almost on a par with that obtaining among the Hindus) into one of immense magnitude, the genuine Indian Botany, which should have been a continuation and further development of the work of the ancestors of the present race of Indians, is not only where it was, but has been managed to be forgotten and thrown into the limbo of oblivion, from which it is today impossible and even regarded as unnecessary to rescue.

The so-called 'Indian Botany' of the modern times, pioneered by Europeans and collaborated at both by Indian[1] and western scholars, covers really an insignificant niche in the daily-growing museum of the sciences, arts and economic products built up by the people of western countries. And Indians are left in the position of mourning over a national loss: "When we remember how great a part Indian plants have played in contributing to the material and spiritual wealth of India, and in influencing Indian life in its manifold aspects; and when we take into consideration the important place Botany should occupy in every scheme of liberal education, not only as a particular branch of physical science, but also as the most stimulating and refreshing subject of learning, we can estimate the loss both in intellect and material wealth we have been suffering from owing to the neglect of this study. The irony of the situation is that we do not see that the study is the cheapest and least expensive. To add to the tragedy, we forget that the study is also the most paying; for India is *the* country where worldly careers and lucrative professions can be built up on the products of the vegetable kingdom alone."[1]

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[1] Important Indian names are Uday Chand Dutt, Moodeen Sheriff, K. R. Kirtikar, T. N. Mookerji, N. G. Mookerji, Upendra Nath Kanjilal, Bhaudajee, Naraindajee, B. D. Basu, Sakharam Arjun, Lisboa, Ranado, Kanay Lall Dey, Kaviraj Biraja Charan Gupta.

In the history of Hindu Botany, then, the whole 19th century – the period of Botany strictly so called in Europe—is a total blank. It has not only given rise to no men who could undertake independent original investigations in the scientific aspects of Plant-life, but has even produced none who could collect, summarise, and adapt or modernise the teachings of their forefathers. The practitioners in the ***Ayurvedic*** system of medicine have but kept up a tolerable second-hand familiarity with the names and uses of the indigenous medicinal plants, through the services of professional herbalists, the Musheras in Central and Upper India,[2] the low caste Maules, Bâgdis, Pods, Chandâls, Kaoros and Karanges in Bengal, and the Chandras, Bhils and Gâmtâs in Bombay.

3. *Summary of Researches in Hindu Botany.*[3]

Under these circumstances, it is not strange that people should entertain doubt regarding the achievements of Hindus in botanical science and the existence of such a thing as the Science of Botany in ancient Hindu literature. The field is altogether untrodden, and awaits the thankless labour of patient investigators, who must be adequately equipped with the double engine of a thorough mastery of modern Botany and a general grasp of the several branches of Hindu literature. And the problem is to carefully glean from the extraneous literary, medical and economic associations, in which the plants have been mentioned by Hindu authors, the abstract ideas and purely scientific concepts, if any, regarding their life-history, morphology, physiology, habit &c.

In the following pages quotations from the works on subjects more or less allied to these topics are being appended, to give an idea of the up-to-date research undertaken.

(*a*) *Gondal.*

The Thakur Sahib of Gondal's *History of Aryan Medical Scievce,*[4] though not the first work on the subject of Hindu medicine, contains perhaps the first treatment of Hindu Botany. The following is taken from Chapter VII, called Indian Materia Medica. The Ancient Aryans have taken the trouble to examine and study all the herbs that came under their observation, and classified them into groups or *Gaṇas*. Charaka gives fifty groups of ten herbs each, which, he thinks, "are enough for the purposes of an ordinary physician", though at the same time he adds that "the number of groups can be increased to any extent." Similarly, Susruta has arranged 760 herbs in 37 sets, according to some common properties. Other writers have added to the list, which forms an interesting literature of the materia medica of India. They have also described the proper seasons for gathering the herbs, the period of their growth, when they possess their distinctive properties, the localities from which they should be collected, and the manner of treating them, extracting their active principles, and preserving them. Some of the groups[1] mentioned by Indian writers are given below :—

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[1] *The Economic Botany of India* by Prof. Bhim Chandra Chatterji (published by the District Council of National Education, Malda, Bengal 1910 , pp. 12-13.

[2] See the paper *On the Study of Indigenous Drugs* By Surgeon-Captain (now Major) B. D. Basu, I. M. S., in the *Indian Medical Gazette*, July 1891.

[3] See the history of mineralogical literature for the names of treatises dealing with plants and plant life. Mineralogy, Chemistry and Botany of the Hindus are to be culled mainly from their medical literature. Non-medical literature is also likely to yield genuine scientific notions, if critically studied.

[4] Published by Macmillan & Co., London, 1896. Previous works are those of Drs. Wise and Udoychând Dutt.

1. Anga marda praśamana (anti-spasmodic), as Vidarigandhâ (Costus speciosus)

2. Anuloma (Cathartic), as Haritaki (Terminalia chebula)

Agnivesa enumerates no less than 500 classes of medicinal agents, arranged according to their real or supposed virtues in curing diseases A few classes have been selected from this and other sources and noted above.

The chief notable feature in connexion with the nomenclature of the Indian plants is that in several cases their names are descriptive either of their character or of their property. A few instances of names,[2] descriptive of the prominent specific character of the herb, may be given below :—

(*a*) *Brachyramphus sonchifolius* is called Âkhu-karṇi (rat-eared), as the leaves of the plant resemble the ears of a mouse

(*b*) *Acorus calamus* is called Ugra-gandhâ (strong-smelling), because it gives off a very pungent odour.

(*c*) *Clitoria ternatea* is called Go-karṇi (cow-eared), from the supposed resemblance of the seeds to the ears of a cow.

(*d*) *Datura alba* is called Ghantâpuṣpa (bell-flower), from the shape of its flowers.

The following are a few names[3] descriptive of the inherent virtue of the herb :—

(*a*) *Amygdalus communis* is called Vâta-vairi (wind-enemy), as it cures disorders of the wind.

(*b*) *Embelia ribes* is called Krimighna (worm-killer), from its anthelmintic properties.

(*c*) *Ophelia chiretta* is named Jvarântaka (fever-ending), for it is supposed to check fever.

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[1] A list of 75 names has been given by the Thakur Sahib. See pp. 104-110.

[2] A list of 10 names has been given. See pp. 110-11.

[3] A list of 10 names has been given. See pp. 111-113.

(*d*) *Semecarpus anacardium* is known as Aruskara (eschar-causing), because when applied to a living part its juice gives rise to an eschar.

Each successive writer, after a patient and careful investigation, appears to have added new drugs [1] to the existing list. Some of the writers emphatically assert that all curative agents mentioned in their treatises have been thoroughly tested and recommended after a long practical experience. Susruta strongly recommends that physicians should be able to identify the various remedial agents they have to deal with. They should personally go to the jungles, and with the help of shepherds, graziers, ascetics, travellers and others familiar with the forest, gather the herbs when they are in flower, taking care to avoid those injured by insects, or growing in situations containing nests of white ants, or where bodies have been burnt or buried, or from ground in which there is much salt. Narahari Pandit (author of *Râja-nighantu* of the 17th century) describes the properties of different kinds of soil, the nature of soils suitable for the cultivation of various medicinal plants, varieties of trees, cereals, oils, vegetables, roots, leaves, flowers and fruits.

(*b*) *Dr. Sen.*

It would appear that the Thakur Sahib did not approach the subject from our standpoint, *viz.*, the study of the strictly scientific ideas of the Hindus regarding plants and plant life. However, no subsequent scholar has interested himself in the subject to any special extent, and this is all that constitutes the foundation of modern researches in ancient Hindu botanical studies.

In his paper on the study of medical science in ancient India,[2] Dr. Gaṇanâth Sen gives the following paragraph on the subject : " In Botany, unfortunately, very scanty records have been left in the writings of Râghava Bhatta and Sârangadhara - an important section of which (*Upavanavinoda*) the humble writer of this paper had the honour of editing and translating some years ago. The informations contained in these books are numerous. Plants have been called *sthâvarajiva*, or fixed animals, and pleasure and pain have been attributed to them. (Compare in this connection the recent discoveries of *Plant Response* by the illustrious Dr. J. C. Bose of Calcutta). Again, plants have been called *sexual* and *a-sexual*, although the details of the sexual phase are missing. Much advance in the practical application of Botany appears to have been made. A regular symptomatology of plants has been described under the name, *Brikṣâyurveda*, and the treatment of certain diseases of plants has been stated. Then, again, an interesting science of finding out *sub-terranean veins of water*,[3] as the geologist calls them, has been briefly described by certain signs, which, says tradition, often come off correct."

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[1] See *Hist. of Ar. med. Sc.* pp. 118-123, for the new drugs introduced by successive writers. The Thakur Sahib's chronology requires to be corrected in the light of recent research, *e.g.*, of Dr. P. C. Ray in the *History of Hindu Chemistry.*

[2] Road at the *Sâhitya Sabhâ* of Calcutta, September, 1906, published by the same society in 1908.

[3] Cf. Chapter LIV of *Brihat Samhitâ*, called *Dagârgalam.*

(*c*) *Prof. Chatterji.*

In the *Economic Botany of India*[1] by Prof. Bhim Chandra Chatterji of the National Council of Education, Bengal, there are a few more details about the achievements of Hindus in the field of botanical science, with remarks as to their relative, historical and comparative values by reference to the progress of the science in Europe. His general remarks on Indian Botany are given below: "This characteristic of Indian culture[2] that it was essentially practical, meant for and adapted to, the thousand and one duties of actual life, has made it always very comprehensive, all-embracing, and all-inclusive. Every Sâstra or Purâṇa or Samhitâ has thus become an Encyclopædia; * * * and, as in the physical, so in the human sciences, we search in vain for the differentiation of knowledge into various branches corresponding to the various aspects of human life. We have no Indian psychology, no Indian ethics, no Indian politics, just as we have no Indian physics, no Indian chemistry, no Indian botany, and so forth, as independent and distinct branches of learning, differentiated from the treatises on universal knowledge.

"* * * European Botany has had a far different history. * * * Not only were the main branches of learning divided among specialists for exclusive study; but each of the various departments of the same branch began to enlist on its behalf the whole time and energy of special sections of the devoted men of science. Add to this the intellectual energy of Europe that became multiplied by being divided and differentiated for the furtherance of national interests and promotion of national glory (owing to the creation of national churches, national states, national literatures, and national schools), and we may form an idea of the enormous labour that has been spent ungrudgingly upon what is to-day a vast Botanical science, which, again, is being split up into independent sciences, distinct from one another.

"But Indian Botany has claims to our recognition on ***absolute*** grounds as well, as having suggested, recognised or discovered some truths about vegetable life which are accepted by modern phytotomy and physiology."

In Internal Morphology we have such descriptions as those of *Tinospora cordifolia* (Guduchi) which is characterised as *Chakrângi*, *Kundali*, *Mandali*, &c,—terms referring to the annular rings so prominent in the cross-section or transverse section of the creeper. Metamorphosis of leaves, descriptions of characteristic leaves according to the similarities with the animal world, knowledge of adventitious roots &c., may be referred to as evidences of the study of external morphology. In physiology it must be credited to the Hindus that they know of plants as living organisms. Prof. Chatterji quotes from the *Sântiparva*[1] of the Mahâbhârata to prove their acquaintance with the sap-circulation[2], nourishment, power of movement, independent growth and reproduction of plants. "It reflects great credit on those scholars that they conceived the idea of the sexuality of plants and the truth that flowers are the organs of sexual reproduction in higher plants — notions which were first suggested by Camerius towards the close of the 17th century and which have been demonstrated in the 18th and 19th centuries by the studies of Koelrenter, Herbart and Gaertner in hybridisation. To express this sexuality some are even expressly named as such, *e.g.*, *yonipuṣpa* (Cletoria termcata), *lingapuṣpa* (Nerium odorum), meaning respectively the female and the male—and these, together with such terms as *vajrapuṣpa*, menstrual blood of a certain type in Tantra, would lead to the idea that the fact of the flower being the genetive organ of the tree was not unfamiliar to them."

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[1] This brochure was published by the District Council of National Education, Malda, (Bengal) in 1910 and intended to interest people in the forthcoming work on *Indian Medicinal Plants* (a Systematic study, along modern scientific lines, of the most important medicinal plants of India, specially those mentioned in the original Sanskrit works, and also of several other useful plants) with 1300 plates, by Lt. Colonel K. R. Kirtikar, Major B. D. Basu, Prof. Bhimchandra Chatterji and an I. C. S. The work has been in the press for some time and will be published by the Pâṇini Office, Allahabad, in 1915.

[2] Pp. 23-24.

Phosphorescence[3] and exudation[4] of water were probably known. The knowledge of Heliotropic movement is indicated by such terms as *Âdityakrânta*, *Suryabhaktâ*, etc., that of Nyctitropic movement by such terms as *Anjalikârikâ* (folded palm), *Namaskâri* (plant which bows down), *Sparsalajjâ* (which feels bashfulness at touch), referring to *Mimosa pudica*. Rejuvenation, separation and multiplication of the individuals which are so essential requisties of reproduction seem also to have been well understood.

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[1] बन्यानामपि वृक्षाणामाकाशोऽस्ति न संशय: ।
तेषां पुष्पफलव्यक्तिर्नित्यं समुपपद्यते ॥
उष्मतो म्लायते पर्णं त्वक् फलं पुष्पमेव च ।
म्लायते शीर्य्यते चापि स्पर्शस्तेनात्र विद्यते ॥
वाय्वग्न्यशनि-निर्घोषै: फलं पुष्पं विशीर्य्यते ।
श्रोत्रेण गृह्यते शब्दस्तस्माच्छृण्वन्ति पादपा: ॥
वल्ली वेष्टयते वृक्षं सर्व्वतश्चैव गच्छति ।
नह्यद्रष्टुश्चमार्गोऽस्ति तस्मात् पश्यन्ति पादपा: ॥
पुण्यापुण्यैस्तथा गन्धैर्धूपैश्च विविधैरपि ।
अरोगा: पुष्पिता: सन्ति तस्माज्जिघ्रन्ति पादपा: ॥
पादै: सलिल-पानाच्च व्याधीनाञ्चापि दर्शनात् ।
व्याधि-प्रतिक्रियत्वाच्च विद्यते रसनं द्रुमे ॥
वक्त्रेणोत्पलनालेन यथोर्द्ध्वं जलमाददेत् ।
तथा पवनसंयुक्त: पादै: पिबति पादप: ॥
सुखदु:खयोश्च ग्रहणात् छिन्नस्य च विरोहणात् ।
जीवं पश्यामि वृक्षाणामचैतन्यं न विद्यते ॥ शान्तिपर्व्व, महाभारत ।

[2] Sap-circulation was discovered by Harvey in the 17th century.

[3] वनेचराणां वनितासखानां दरीगृहोत्सङ्गनिषक्तभास: ।
भवन्ति यत्रौषधयो रजन्यामतैलपूरा: सुरतप्रदीपा: ॥
तां हंसमाला: शरदीव गङ्गां महौषधिं नक्तमिवात्मभास: ।
स्थिरोपदेशामुपदेशकाले प्रपेदिरे प्राक्तनजन्मविद्या: ॥ Kumârasambhavam.
ज्योतिष्मती तु कटभी सुवर्णलतिकेति च ।
ज्योतिष्कायाऽग्निभासा च लवणोक्ता च दुर्जरा ॥ Dhanwantari-nighantu.
ज्योतिष्मती स्वर्णलताऽनलप्रभा ज्योतिर्लता सा कटभी सुपिङ्गला ।
दीप्ता च मेध्या मतिदा च दुर्जरा सरस्वती स्यादमृताऽर्कसंख्यया ॥ Râjanighantu.

[4] स्याद्द्रवन्ती स्रवत्तोया सञ्जीवन्यमृतस्रवा ।
ushed m. रोमाञ्चिका महामांसी चपचली सुधास्रवा Râjanighantu.

Prof. Chatterji traces in the Rig Veda (VIII—47-9 and II, 1-14) the knowledge of Photosynthesis and the action of light and storage of energy on plants. The facts that the sun is the source of energy in the fuel, that it is the setting sun, *i.e.*, that having less refractive rays whence the energy is transformed and kept in the potential form in the fuel, and that this potential energy is manifested as fire or heat, are also known.

The two points, (1) the assimilation of potential energy from the sun and (2) the special suitability of red, orange and yellow rays for the more effective assimilation of plants, *i.e.*, for the storage of energy in the potential form, are definitely suggested in the following :—

अपूस्वग्ने सधिष्टव सौषधीरनुरुध्यसे गर्भे सञ्जायसे पुन: । Rig. viii. 43-9.

त्वे अग्ने विश्वे अमृतासो अद्रुह आसादेवा हविरदन्त्याहुतम् ।
त्वयामर्त्तास: स्वदन्त आसुतिं त्वं गर्भो वीरुधां जज्ञिषे शुचि: ॥ Rig. 2-1-14.

अग्नावोषधिषु च तेजोनिधाय रविरस्तं यातीति आगम: । Mallinâtha.

दिनान्ते निहितं तेज: सवित्रेव हुताशन: । Raghuvamsam.

The first of these is clearly stated in the above by the terms "गर्भे सञ्जायसे पुन:" "त्वं गर्भो वीरुधां" and in the whole of the last texts, which further show that the sun is the source of the energy in the fuel and that it is the setting sun, *i e*, having the less refractive rays whence the तेज: or energy is transformed and kept in the potential form, which is manifested as fire or heat.

The *Theory of Evolution* has been described in the following—

(1) तस्मादात्मन: आकाश: सञ्जायत । आकाशात् वायु: वायोरग्नि: अग्नेराप: अद्भ्य: पृथिवी, पृथिव्या ओषधय: ओषधिभ्योऽन्नं अन्नात् रेत: रेतात् पुरुष: । Chhândogya Upanisat.

(2) स्थावरं विंशतेर्लक्षं जलजं नवलक्षकं
कूर्म्माश्च नवलक्षञ्च दशलक्षं च पक्षिण: ॥
त्रिंशल्लक्षं पशूनाञ्च चतुर्लक्षं च वानरा: ।
ततो मनुष्यतां प्राप्य तत्तत्कर्म्माणि साधयेत् ॥

एतेषु भ्रमणं कृत्वा द्विजत्वमुपजायते ।
सर्व्वयोनिं परित्यज्य ब्रह्मयोनिमतोऽभ्यगात् ॥ Brihat Visṇu Purâṇa.

In the *Brihat Visṇu Purâṇa* an attempt has been made to give the successive stages of development of man to even *Brahmayoni*, the highest form of existence. The *Phylogenetic* and *Onlogenetic* developments are laid down as well as the comparative duration of the stages. The successive number of stages would indeed be visible only after thousands of years of persistent scientific observation of a race of Darwins.

Two things should be further noticed in the text of Brihat Visnu Purâna. First, that aquatic life precedes the monkey life, and that the monkey is the progenitor of man. Again, the descent of man from some aquatic animal, although by a remote degree, is grasped with equal acuteness. These ideas are attributed to Darwin; and our countrymen are scarcely aware of the fact that the truths did not fail to strike the savants of ancient India.

Vidyâpati has given the order from the highest to successive lower stages:—

किए मानुष पशु पाखी भये जनमिये ।
अथवा कीट पतङ्ग ॥
करम बिपाक गतागत पुन पुन ।
मतिरहू तुया पर सङ्ग ॥

That Indian literature should contain such a full account of the evolution of the animal kingdom from the vegetable world, which could be seen only by a Darwin or a Hæckel in such recent times as the 19th century, ought to inspire thoughtful Indians with a noble vanity, and should infuse into our countrymen a spirit of research with a view to finding out the truths in our Sâstras.

"The idea of gradual evolution of higher organisms from lower, was familiar to the Greek philosophers, but a scientific basis was given to this hypothesis in the last century" (Strasburger). Says Prof. Chatterji: "Is it not our duty to demonstrate to the world that the Hindu sages conceived the idea long before it was dreamt of by any other nation, and as such, their names should precede those of any other philosophers? Had the commentators been as acute in explaining these texts, Darwin might have been anticipated in our country long before his name could be heard in the world; or is it that some such commentators lie unnoticed in the dark caves of the Himâlayas?—"Some mute inglorious Milton here my rest!"

In all the above, however, I would only remark that these truths of Botanical Physiology were known to the Hindus simply *as facts*, but no trace has been found as yet regarding their knowledge of the "science" of physiology, *i.e.*, as to *how* these take place in nature; in short, they have observed the facts without caring to 'explain' them or *assign reasons*. And here, again, as in so many other things, we have to continue, by our specialised efforts, the work of our ancestors, and develop them along the proper lines, just as the European scholars of the 17th, 18th and 19th centuries have, by their own labours, improved upon, and added to, the heritage bequeathed by their ancestors of the classic age.

In *Systematic Botany* nothing approaching the keen observation and generalisation of modern times is to be found. One peculiarity has not been traced through a sufficiently large number of plants, and we find only isolated instances of two or three plants classified under one group. Thus, सरल (*Pinus longifolia*) and देवदारु (*Pinus deodara*) are placed in one group, *i. e.*, one is described just after the other in *Madanapâla-Nighantu*, and such instances are found in abundance in all the authors. चिलगोजा or निकोचक (*Pinus gerardine*) could have also [illegible] laced in the same group, but. instead, it is named along with अक्षोड़ [illegible]uished m[illegible] *gia*), etc.

The basis of classification is the property of the plants; e.g., in चन्दनादिवर्ग all sweet-scented things, such as Sandal wood, are mentioned, and in शाकवर्ग all vegetables. In these, however, further subdivisions are made, and here we find some more systematic arrangement, as all कर्कारु, (*Cucurbita papo*), कुष्माण्ड (*Benincasa cerifera*) etc., are grouped together. When one thing has more than one property it is grouped to bring out, as in *Cucurbitaceæ*, the most prominent characteristic, the whole being adjusted to the convenience of a practical man.

खदिर (*Acacia catechu*), रक्तखदिर (*Acacia sundria*), श्वेतखदिर विट्खदिर (*A. farnesiana*) and अरि (*A. pennata*) are all put together in Dhanvantari and in Râja-nighantu in शाल्मलीवर्ग, which is based on the common possession of thorns. Again, many of the plants in *Cucurbitaceæ* have been placed together most possibly for similarity of the fruit. पाषाणभेद, वटपत्री, श्वेतशिला, चतुष्पत्री in *Saxafraga* and निम्ब (*Melia azadirachta*), महानिम्ब (*Melia azadirachta*), कडर्य्य (*Alianthus excelsa* Roxb), of the *Melianceæ* order, have been placed together for the similarity of the bitterness of the principle in flowers, fruits and leaves. Plants producing bulbs are sometimes placed together. So, in short, any quality or peculiarity has been taken, and plants divided into various artificial groups.

The above will substantiate the view that, under each *varga* or principal group, the members of the same family have been placed together, these so often possessing many properties in common.

The identifying principle accepted by the Indian Botanists depends upon a large number of facts, such as (1) locality, which touches upon Geographical Botany, (2) description of the plant by comparison of its leaves, flowers, roots, fruit, branch, juice, colour, smell and property etc., with some other known things. These things are so given that in most cases all the connotations of one are not found in any other; but very unfortunately, in many cases, the synonyms are highly preplexing indeed

One instance will be sufficient here to show the difficulty. आखुकर्णी (*Salvania cucullata*) and द्रवन्ती (*Ipomœa reniformis*) are thus described :

Ipomœa reniformis :

द्रवन्ती शम्बरी चित्रा न्यग्रोधा मूषिकाह्वया ।
प्रत्येकश्रेणी वृषा चण्डा पुत्रश्रेण्याखुपर्णिका ॥ Dhanwantari.
द्रवन्ती शाम्बरी चित्रा न्यग्रोधी शतमूलिका ।
प्रत्येकश्रेणी वृषा चण्डा पुत्रश्रेण्याखुकर्णिका ॥
मूषिकाह्वादिका कर्णी प्रतिपर्णी छिनका च सा ।
महस्रमूली विक्रान्ता ज्ञेया स्याच्चतुरेकधा ॥ Râja-nighantu.

Salvania cucullata :

स्यादाखुकर्णी वृषिका द्रवन्ती चित्रा सुकर्ण्युन्दुरुकर्णिका ।
न्यग्रोधिका मूषकनाम कर्णी स्याद्वृश्चिककर्णी बहुकर्णिका च ॥
माता भूमिचरी चण्डा शम्बरी बहुपादिका ।
प्रत्येकश्रेणी वृषा चैव पुत्रश्रेण्यद्रिभूह्वया ॥ Râja-nighantu.

The comparison will show the synonyms, and th[illegible] description of one will be seen to be a mere repetition of the other. The l [illegible] been p [illegible] Juglans re [illegible] ानी for both. *The properties, however, in one are different from those in the other;* fortunately, these are observed in local usages. Hence, the one can be distinguished from the other simply by taking advantage of the properties and nothing else.

Such synonyms recur in many places, and we find the following rule for identification :

नानाभिधेयमथ यन्त्र शिवा समङ्गा
श्यामादि नाम निगमेषु निवेदितं यत् ।
प्रस्तावर्वीर्य्यरसयोगवसादमुष्य
बुद्ध्या विमृश्य भिषजाऽत्र धृतिर्विधेया ॥ Râjanighantu.

In many cases, however, the descriptions are quite characteristic, as in हस्ताञ्जली, *e g., Orchis latifolia*, which is thus described.

हस्तपर्य्यायपूर्व्वस्तु:जोङ्घ्रिवेद्यैर्वरैः स्मृतः ।
करजोङ्घ्रिमिति ख्यातो रसगन्धादिवश्यकृत् ॥ Râjanighantu

In this, instead of speaking of any of its peculiarities, the specialist just compares it with the folded palm of the hand which will at once identify it and differentiate it from the rest of the vegetable world.

From terms used in the slokas as synonyms, we get the entire clue to the identification of the plant. A negligence in thoroughly examining these terms has led to disastrous mistakes which have spoilt half the merit of our well-tried system of medicine.

The classifications adopted in Charaka in describing पञ्चाशन्महाकषाया: and in Susruta in सप्तत्रिंशद्गणा: are based purely upon the properties of plants; consequently these involve the repetition of one plant in different places Of the same plant possessing several properties, for instance, यष्टीमधु (*Glycyrrhiza glabra* or *Liquorice* root), mention has been made in connection with

1. जीवनीयानि (medicines which prolong life)
2. सन्धानीयानि (medicines which promote the union of fractured or divided parts.)
3. वर्ण्यानि (medicines which improve the complexion)
4. कण्ठ्यानि (medicines which improve the voice)
5. कण्डुघ्नानि (medicines which cure pruritus)
6. छर्दिनिग्रहणानि (medicines which relieve vomiting)
7. पुरीषबिरजनीयानि (medicines which alter the colour of the fæces)
8. मुत्रबिरजनीयानि (medicines wich alter the colour of urine)

In each of these groupings there are ten plants mentioned. So there is *Cross division* in many cases.

In Susruta also we find similar classification, according to properties of er. Other treatises on Medicine also group them according to certain culiarities, and each grouping is fantastically named after a certain distinguished member of the group. For example, we find in ***Dhanwantari***

Nighantu—गुडूच्यादिवर्गः, शताह्वादिवर्गः, पर्पटादिवर्गः, पिप्पल्यादिवर्गः, शाल्मल्यादिवर्गः, प्रभद्रादिवर्गः, करवीरादिवर्गः, आम्रादिवर्गः, चन्दनादिवर्गः; *in Madanapála Nighantu*—अभयादिवर्गः, शुण्ठ्यादिवर्गः, कर्पूरप्रभृतिसुगन्धिद्रव्यवर्गः, वटादिवर्गः, फलादिवर्गः, शाकवर्गः इक्षुवर्गः, धान्यवर्गः, *in Bhâvaprakâsa* हरितक्यादिवर्गः, गुडूच्यादिवर्गः, पुष्पवर्गः, वटादिवर्गः, आम्रादिफलवर्गः ।

It would thus appear that the Indian system of classification does not accurately correspond to the classification into Natural Orders which has been founded under the unfluence of the Dogma of the Constancy of Species during the period from 1750 to 1850, and under that of the study of the Cryptogams in the latter half of the 19th century. It differs widely from the artificial classifications of Brunfels, Fuchs, and other Botanists of Germany and Netherlands who flourished in the 16th century, or of Cisalpino, the Italian Botanist of the same century, who attempted to divide plants into groups by philosophical reflection. While *mainly artificial*, the Indian system may be compared not to that of Linnæus, but of Jussieus, who based it on properties. And for all practical purposes, whatever may be said against its scientific value, a system based on properties was more useful than the systems of the early European Botanists, which, according to Sachs, were too vague and insufficient for identification.

(*d*) *Other Scholars*

In a recent publication[1] Dr. Sumant B. Mehta, lately personal physician to H. H. the Maharaja Gaekwad of Baroda says : "Susruta divides the vegetable kingdom into Vriksa, Gulma, Vanaspati, and Virudha More information of the science exists in the writings of Râghava Bhatta and Sârangadhara, a section of which, called *Upavanavinoda*, has been translated by Dr. Gananâth Sen of Calcutta. The divisions mentioned above have been worked out into minute subdivisions, but a systematic Botany like the one developed in Europe in modern times did not exist in India. Occasional mention of the habitat of plants, and the description of their foliage exists, but there is no system about it The ancient physicians have indeed written several books on the Materia Medica, and they have laid great stress on the individual characteristics of drugs, which would make the work of identification easy."

In a very short paper[2] on the names of Vedic plants, Mr. Bijaychandra Majumdar has drawn the attention of Bengali readers to the scientific aspect of Hindu Botany, but has touched only the fringe of it.

APPENDIX A.

(*e*) *Dr. Seal.*

Dr. Brajendranâth Seal has kindly furnished me his notes on scientific concepts of the Hindus regarding plant physiology and classification. His studies are based mainly on non-medical literature and rare commentaries of older authorities. His researches therefore exculde the sources that are generally utilised by students of Hindu botany and medicine. The papers, however, reached me after the printing of this work had considerably advanced. Hence they are placed in the Appendix along with other papers from the same pen.

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[1] The *Ayurvedic System of Medicine* (Navsari, Bombay, 1913), p. 28.

[2] The Bengali monthly, *Bhârati*, for Kârtic 1913.

4. *Concluding Remarks.*

The foregoing account is a summary of all that has been done in investigating the contributions of the ancient Hindus to the universal science of botany. The account is very meagre, indeed, and indicates that up till now no serious effort has really been made to estimate the botanical value of the Hindu writings on medicine, agriculture, grammar, astronomy, &c. It is high time that the work should be taken up in right earnest as a piece of historical research.

Identification and determination of Indian plants have been rendered tolerably easy. " The principal factors which have contributed to increase our knowledge of indigenous drugs during this century have been the labours of men like O'Shaughnessy, Waring, and Kanny Lall Dey, the holding of Exhibitions, the works of botanists, and forest-officers ; and lastly the various scientific societies, notably the Bengal Asiatic Society, the Calcutta Medico-Physical Society, and the Agri-Horticultural Society." [1] The work before Indian Botanists to-day is to equip themselves with a knowledge of Sanskrit and Vernacular literatures and ransack the whole field of Indian literature in order (i) to find out the species of plants named or described therein and (ii) discover in the light of modern knowledge the scientific truths or half-truths they were intended to impart.

There is no reason for despair. The new Teaching Universities with Research Departments that are being promoted throughout the length and breadth of India at important centres, the Oriental Research Institute projected by the Government of India, the College of Science financed by the philanthropic donors of Bengal, Sir Tárak Náth Pálit and Dr. Ráshbehári Ghosh, the private Academies of Research, and literary as well as educational Councils that have been ushered into being during the last two decades or so, under the impulse of popular upheaval here and there and everywhere in India -all these are expected to be seminaries of independent thought and nurseries of original scholars who would devote themselves to studying the pressing problems of the day together with the antiquities of the country. So that in the near future the national culture and civilisation of India may assert their rightful place in the consciousness of mankind and the history of human progress.

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[1] *The Study of Indigenous Drugs* in the *Indian Medical Gazette*, August, 1892.

CHAPTER VI.

THE DATA OF ANCIENT INDIAN ZOOLOGY.

SECTION I.

The Secular Sciences of the Hindus.

In trying to estimate the knowledge of the Sukra authors regarding the physical and objective world, we have incidentally noticed in the two preceding chapters several important facts in the history of Indian culture :

I. The mineralogical, medical, chemical, and botanical sciences, industries, and arts were wide and deep enough to be drawn upon with advantage by writers of general Sociological treatises like *Sukraniti.*

II. In these physical or "nature studies" lay the *forte* of special schools of Hindu thinkers, who, as masters or commentators[1], were the authors of specialised[2] branches of scientific literature.

III. These schools of Hindu physical science, whether embodied in individual 'masters' or collective organisations like the Parisats (*i.e.*, Academies) stood up not simply for the conservation of the statical products of a bygone age, but represented in and through them the dynamical processes of the march of human knowledge. They thus kept moving (i) from epoch to epoch and (ii) from province to province according to the progress of scientific spirit and general culture in Hindusthan, and hence more or less resembled, both in diversity of administration and uniformity of language and literature, the so many scattered centres of culture and learning, called the Universities, which sprang up into existence in the German[3]-speaking world, during the period from the 14th to the

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[1] The importance of these commentators in Indian Literature who were not servile copyists or imitators, but enriched the texts commented upon by the addition of their own original investigations as well as the culture of ages. has been critically vindicated by Goldstücker in his *Panini.*

[2] See Major Basu's paper on *Indigenous Medicine* in the Modern Review for March 1914.

[3] See the account of the development of German Universities in Merz's *History of European Thought in the 19th century.* Vol. I, pp. 159-163 ; also the Footnotes. The great cultural uniformity of Hindusthan and the fundamental unity of the Indian Soul as attested by the (i) existence of Sanskrit as the common language for educated and spiritual India and the (ii) predominance and emphasis of the same sets of morals, manners, sentiments and traditions in the everyday life and institutions of the people throughout the length and breadth of India (inspite of the thousand and one barriers to political unity presented by the kaleidoscopic revolutions and boundary-settlements) may be compared with the unifying conditions of German culture, learning and civilisation, inspite of the diversity and disunion of political life that characterise the history of the German peoples till the formation of a nationality and an empire in 1870.

The following facts about the history of German culture have a close parallel in the history of Indian civilisation : "It is not a stationary power, but is continually

18th century. The Indian sciences should not, therefore, be regarded as the finished creations of certain golden eras in Indian history or the characteristic products of one or other of the various races that have peopled India, but are the results (i) of a continuous evolution incorporating the cumulative experience of ages, and (ii) of the conscious or unconscious collaboration of master-minds, systematisers, compilers and commentators belonging to the north, south, east, west and middle of India.

IV. A rigid and unbiassed comparison of the achievements of the Hindus in physical sciences, whether as academic and abstract branches of learning or as aids to practical and utilitarian aspects of life with the contributions of the western thinkers to the same would show that in Europe it is really during the Revolutionary period (1789-1815) or more strictly speaking since 1815[1] that the epoch of the Industrial Revolution and the pre-eminently scientific era which characterise the modern age really begins. And that previous to that, *i.e.*, up to about the beginning of the 19th century, the Hindu as well as the European thinkers were almost on a par. The inductive sciences of the west had not till then displayed the magnificent results which we have been accustomed to associate with them during the latter half of the 19th century. So that it is only the last century's work by which the people of Hindusthan are behind their colleagues in the west.

SECTION 2.

The Alleged Decline of Hindu Intellect.

This aspect of the question requires a little elaborate treatment, since even one of the greatest scientists of our country seems to have been carried away and have supplied the cue for a lament over the "decline of scientific spirit" among the Hindus, and over "this land of intellectual torpor and stagnation."

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on the move from south to north, from west to east, to and fro, exchanging and recruiting its forces, bringing heterogeneous elements into close contact, spreading everywhere the seed of new ideas and discoveries, and preparing new land for still more extended cultivation." "The migration of students as well as eminent professors from one University to another is one of the most important features of German academic life." "There is scarcely a stronger bond of union between the various parts of Germany than that supplied by the Universities, and in no other respect have the barriers that separated state from state been so long broken down." See in this connexion Prof. Radhakumud Mookerji's *Fundamental Geographical Unity of India.* (Longmans Green & Co., 1914).

[1] For an account of the comparatively recent origins of the 'modern' sciences see Weir's *Historical Basis of Modern Europe* (Swan Sonnenschein & Co., London, 1886, pp. 315-169; Mackenzie's *19th century* (Nelson & Sons, 1823), pp. 181-206 309-315, 338, 372-73, 429-432; Price's *Political Economy in England* (Methuen & Co., London, 1900), pp. 5-7 ; Merz's *History of European Thought in the 19th century* in two Volumes (Blackwood and Sons, London, 1901) ; Marshall's *Principles of Economics.*

Dr. P. C. Ray concludes his celebrated History of Hindu Chemistry thus :

" The arts being thus relegated to the low castes and the professions made hereditary, a certain degree of fineness, delicacy and deftness in manipulation was no doubt secured, but this was done at a terrible cost. The intellectual portion of the community being thus withdrawn from active participation in the art, the *how* and *why* of phenomena—the co-ordination of cause and effect—were lost sight of. The spirit of inquiry gradually died out among a nation *naturally prone to speculation and metaphysical subtleties*,[1] and India for once bade adieu to experimental and inductive sciences. Among a people ridden by caste and hide-bound by the authorities and injunctions of the Vedas, the Purâṇas and Smritis, and having their intellect thus cramped and paralysed, no Boyle could arise. Her soil was rendered morally unfit for the birth of a Boyle, a Descartes or Newton, and her very name was all but expunged from the map of the Scientific World."

Far be it from our object to detract from the absolute contributions of these western thinkers to the World of Science. It must not be forgotten, however, that the greatest duty the Hindu thinkers were called upon to perform during the period of the so-called torpor and decline of Hindu intellect was the preservation of national existence and the conservation (with necessary adaptation or modification) of the culture of their race against the inroads of aggressive Islam. The greatest achievement of the Hindus and the most marvellous feat of their genius consisted in this that, while other races had to succumb to the steam-roller of 'the Koran, the sword or the tribute' and extinguish all vestiges of their national traditions and institutions, the Hindus alone not only succeeded in withstanding this levelling influence and maintaining their individuality and original race-consciousness, but also in assimilating and utilising the new world-forces in the interest of their own expansion, development and progress.

But for this assimilative capacity, this extraordinary power of displaying and distributing their energies in a *latent* form in the work of social re-construction and synthetic re-adjustments, the whole civilisation of the Hindus would have been swept off the face of the earth and have been driven underground. And instead of a living, moving, growing, and expanding people of to-day the Hindus would perchance have to be excavated and unearthed anew like the fossils of Egyptian, Babylonian and Hellenic culture by future archæologists as merely interesting curios, through which could be dimly deciphered the hieroglyphics of a by-gone age.

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[1] The italics are ours. It is difficult to appreciate the logic of these remarks. If up to the middle of the 17th century, *i.e.*, for a period of over 2,000 years, as Dr. Ray proves by his researches, the so-called caste restrictions and religious prejudices did not stand in the way of scientific work on the part of Hindu scholars and could not prevent them from being at the vanguard of nations, why should these be held responsible for the alleged torpor and demoralisation during the 17th and 18th centuries? More facts require to be unearthed before anything can be proved one way or the other; and a more 'scientific' interpretation of World-Forces that go to make history is also necessary.

The "Doctrine of Substitution" applied by modern economists to the interpretation of the motives and tendencies that underlie human activity in the choice of 'lines of least resistance' and in the investment of resources along various channels in such a way as to derive from each the greatest 'return' with the smallest expenditure, is nothing but a sociological equivalent of, or at any rate, a corollary to, the great Biological Doctrine of the display of vital energy under diverse forms and in varied directions, under the impulse of the 'struggle for existence' and the 'instinct' of self-preservation. The problem before the Hindus during the period referred to by Dr. Ray was pre-eminently and essentially one of social self-preservation, stock-taking and assimilation, re-synthetising of old and new conditions. The struggle was between one socio-religious ideal and another socio-religious ideal, for the Mussalmans did not bring with them any other instruments of culture, ostensibly or as a matter of course. That being the conflict, 'competition' and instinct of self-preservation induced the people of Hindusthan to present not greater and greater original discoveries and inventions in science, industry and philosophy, and an extension of the bounds of human knowledge—[because what they had inherited from their ancestors and developed up till then was already too adequate for what their opponents could possibly display from their armouries and arsenals of cultural equipment, or for what the whole encyclopædia of the Saracenic, Græko-Roman and Teutonic-European learning could exhibit], but mainly a more liberal and elastic interpretation of their socio-religious ideals and institutions, a more philosophic re-laying of the foundations of their social and domestic system, necessitated by the changes in the circumstances of their age.

A really scientific reading of the conditions of life produced in India by the advent of Islam would show, not that the Hindu national mind was totally slain during this period, but that it addressed itself to the more pressing needs of the time; not that the Hindu intellect became 'unscientific,' uncritical, totally abstruse and metaphysical, but that it was solving the most practical and secular problems of the age; not that the Hindu race produced only second-rate, third-rate and eighth-rate intellectuals, only commentators, annotators and copyists, but that it gave rise to some of the most original-brained, synthetic philosophers, scientists and sociologists, who were the Newtons, Leibnitzes and Descarteses of the Hindu national life in re-organising the old and thereby creating the new.

Universal History, if philosophically and biologically interpreted, yields only one fundamental lesson about human progress, *viz.*, that the culture of a race is 'relative' to the conditions of the age. According to this doctrine of the Relativity of Culture, which again is really a corollary to the great Biologico-Sociological Doctrine enunciated above, it would be easily admitted that the epoch from Bacon to Linnæus, Humboldt, Whitney and Herbert Spencer has not probably done for humanity an *iota* of work in any way nobler or greater than what has been achieved in Hindusthan by the band of master-minds from Kavîra, Chaitanya, Tukârâma, Nânaka, and other givers of social laws and morals to the days of Râmaprasâda, Râmamohana, Vidyâsâgara and Râmakriṣṇa Paramahaṃsa.

There is another side of the self-humiliation contained in the assertion of Dr. Ray. He does not seem to have looked upon the achievements of modern Europe with a historic and critical eye, and hence the statement is necessarily partial, one-sided and erroneous.

Even supposing that, about say the middle of the 17th century—the age of Newton—Europe began its career of conquest over the powers of nature and marvelleous achievements in physical or secular sciences and industries, we cannot too often remember

(1) that all these achievements were not altogether of a higher order or greater brilliancy than what the Hindus had achieved and maintained even up to the end of the 18th or beginning of the 19th century, so far as ministration to the 'necessaries, comforts, and decencies' of life is concerned;

(2) that it is only since the epoch of "Industrial Revolution," *i.e.*, the second decade of the 19th century, that the west has really been distancing and eclipsing the people of India in the marvels of theoretical science as well as practical arts;

(3) so that, strictly speaking, the modern spirit, the thought that Europe has actually contributed to the culture of universal humanity, is not more than a century old.

That those sciences and industries, which have marked a complete cleavage between the past and the present, for not having contributed to the making of which the Hindus are fallaciously and unnecessarily condemned as non-practical, un-secular, other-worldy, are only the achievements of yesterday, does not require any laborious historical investigation to be substantiated. In the 13th Edition (revised and partly re-written with additions) of *Discoveries and Inventions*[1] by Routledge, the author says: "The enormous material advantage which this age possesses, the cheapness of production * * * are traceable to the division of labour; to the steam-engine; to increased knowledge of the properties of metals; to the use of power tools * * * Little more than a century ago everything was slowly but imperfectly made by the tedious toil of the working man's hand. * * * Let the young reader who wishes to understand why the present epoch is worthy of admiration as a stage in the progress of mankind, address himself to some intelligent person old enough to remember the century in its teens; let him inquire what wonderful changes in the aspect of things have been comprised within the experience of a single life-time."

It would thus be clear that it is only "a single life-time's work," taking a very narrow and practical and rather non-scientific and unhistorical view, by which modern Europe is in advance of mediæval Europe, or what is the same thing, by which India is behind the western world. A rational interpretation of history would thus be a powerful corrective of the cheap and superficial interpretation of India's past which is inclined to explain one and all of the so-called failures of the Hindus by two catch-words describing their national life and character, *viz.*, caste and religiosity.

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[1] **Published by George Routledge and Sons, London, 1900.**

Dr. Ray's *History of Hindu Chemistry* is itself one such corrective. Ram Raz's fragmentary *Essay on the Architecture of the Hindus*, published in the earlier years of the 19th century is perhaps the first work on the subject of Hindu achievements of a secular character. The works of Râjendralâl and Udaychând also belong to the same category. Another eye-opener, in our own times, is Prof. Mookerji's *History of Indian Shipping*. And that monumental product of Dr. Seal's massive intellect, the *Mechanical, Chemical, and Physical Theories of the Hindus*, is also most emphatically calculated to give the lie to the alleged inferiority of the Hindu race in secular[1] and scientific achievements.

SECTION 3.

The Zoological Lore of the Hindus.

The remarks in section 1 indicate, in the first place, the position of Natural History and Science in such sociological treatises as *Niti Sâstras*, and in the second place, at once the achievements and limitations of the Hindus in investigations regarding the facts and phenomena of the physical world. The Zoological Data in the *Sukraniti* also point to the same conclusions.

(*a*) *A brief survey oj Zoology in Europe.*

Like metals, jewels and plants, animals and animal-life also have been the subjects of copious literature in India. For, since the earliest times, Indian Fauna have played an important part in the socio-economic and socio-religious as well as political spheres of Hindu life.

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[1] Recently, Mr. K. P. Jayaswal, in reviewing Dr. Schoff's *Periplus of the Erythraean Sea* for the *Modern Review*, has entered another protest thus :—

"Mr. Schoff has quoted at p. 187 the oft-quoted lines of Matthew Arnold that India let the legions thunder past and she plunged in thought again The lines have really converted history into a vast 'Mississippi of falsehood.' They ought not to find room in any serious treatise. Hindu history at every step gives a lie to the allegation. The very fact of the Greek invasion, on which Mr. Schoff has quoted the lines, instead of being forgotten, was remembered as late as the 5th century A. C., when the defeat of Seleucus was repeated on the stage at Pâtaliputra. The poet wanted the history of Chandragupta, the Maurya, to be re-enacted by Chandragupta the Gupta. Mr. Schoff must be aware of the inscriptions of the so-called Andhras and the Guptas which proudly celebrate conquests over 'the legions.' Medhâtithi, writing after the defeat of the Huns, defined India as a country where 'the legions' could not get a footing even after repeated attempts. The victory of *Sâtakarṇi II* over Nahapâna is still remembered by hundreds of millions of *Hindus* who hear and repeat the historical romance of the Vikramâditya, the Destroyer of the Sakas."

Up to the 18th century the progress of Zoology in India is almost parallel with the course it has had in Europe during the "legendary" stage and the "age of collectors and travellers." Indian literature, if minutely studied in the light of modern theories, would furnish some of the earlier among the following landmarks in the history of Zoology obtained from the records of European research :

"Anatomy and the study of animal mechanism, animal physics and animal chemistry, all of which form part of a true Zoology, were excluded from the usual definition of the word ; * * * and, whilst the Zoologist was thus deprived of the means of anatomical and physiological study, * * * the demands of medicine for a knowledge of the structure of the human animal brought into existence a separate and special study of human anatomy and physiology.

"From these special studies of human structure the knowledge of the anatomy of animals has proceeded. * * * Thus comparative anatomy came into existence as a branch of inquiry apart from Zoology; and it was only in the latter part of the 19th century that the word 'Zoology,' applied to a knowledge of animals which expressly excludes the consideration of their internal structure, was rejected.

"Scientific Zoology really started in the 16th century with the awakening of the new spirit of observation and exploration. * * * The active search for knowledge by means of observation and experiment found its natural home in the universities. Owing to the connexion of medicine with these seats of learning it was natural that the study of the structure and functions of the human body and of the animals nearest to men should take root there. * * * The influence of the great academies of the 17th century was precisely to effect that bringing together of the museum-men and the physicians or anatomists which was needed for further development. * * * It was not until the 19th century that the Microscope (constructed by a Dutch naturalist in 1683) was perfected as an instrument and accomplished for Zoology its final and most important service. * * * It was reserved for Charles Darwin in 1859 to place the whole theory of organic evolution on a new footing." [1]

The brief and not by any means exhaustive survey of Hindu Zoological literature that is given here to indicate lines of research in this field would suggest that, with the exception of Plasmology or "the study of the ultimate corpuscles of living matter, their structure, development and properties, by the aid of the microscope—exemplified by Malphighi, Hook, Schwann and Kowalewsky," almost all the other "currents of thought and mental preoccupation which have been historically manifested in western Europe in the gradual evolution of what is to-day the great river of Zoological doctrine" have had their more or less perfect embodiments in the history of Hindu thought also. Thus, it will be easy to cull from Indian literature, Sanskrit, Prâkrit and vernacular, casual references to, as well as specialised treatises on, animal-life, which may be grouped under the following branches of Zoological study detailed by Sir Edwin Ray Lankester in the latest edition of the *Encyclopædia Britannica* :

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[1] *Encyclopædia Britannica* (11th Edition), Vol. 28, pp. 1022-1024.

(1) Morphography—the work of the collector and systematist exemplified by Linnæus and his predecessors, by Cuvier, Agassiz, Hæckel.

(2) Bionomics, lore of the farmer, gardener, sportsman, and field-naturalist, including thremmatology or the science of breeding, and the allied teleology or science of organic adaptations: exemplified by the patriarch Jacob, the poet Virgil, Sprengel, Kirby and Spence, Wallace and Darwin.

(3) Zoo-dynamics, Zoo-physics, Zoo-chemistry—the pursuit of the learned physician,—anatomy and physiology: exemplified by Harvey, Haller, Hunter, Johann Muller.

(4) Philosophical Zoology—general conceptions with regard to the relations of living things (especially animals), to the Universe, to man, and to the Creator, their origin and significance: exemplified in the writings of the philosophers of classical antiquity, and of Linnæus, Gœthe, Lamarck, Cuvier, Lyell, H. Spencer, and Darwin.

(*b*) *Vedic Fauna.*

The Zoological lore of the Vedic age is not very copious, but gives an adequate picture of the attempts of the people to make themselves acquainted with the various phases of animal-life which came across them.

"The ploughmen sang merrily to the steers (R. V. viii, 20, 19), while ploughing. * * * They kept away birds from robbing them of the growing corn by uttering loud cries (R. V. x 68, 1). * * * The enemies of the agriculturist were rodents, insects and demons which were exorcised by means of spells (A. V. vi 50) A great number of them are named, but cannot be identified. * * * Cattle-rearing followed as subsidiary to agriculture. Cowherds took cows out to pasture daily (R. V. x 19, 4, 5). * * On return from pasture the cows were kept in stalls (*gotra*, R. V, ii ; 23, 8, *vraja* A. V. iii ; 11 5, *gostha* iv ; 21, 1), and water troughs were provided for them in various places. * * Draught-oxen were castrated. * * They reared also goat and sheep. Fat rams for cooking (R. V. x 27, 17) and the ewes of Gandhara, famous for their wool (R. V. i 126, 7), are referred to. Dogs guarded cattle and houses and barked at human thieves (R. V. vii 55, 3), at wolves worrying sheep (A.V. V, 8 4 ; vi 37), and tigers which plague the men rich in kine (A. V. iv 36, 6).[1]

The animal foes of man were roaring lions (R. V. ix 64, 8), wild elephants 'eating forests' (R. V. i 64, 7), tigers, wolves and hyenas (A. V. xii 1, 49) as well as snakes,[2] metaphorically called "ropes with teeth" (A. V. iv, 3, 2), 'brandishihg as it were a club' (A. V. i 27, 2); more than twelve species of snakes are named in the Atharva Veda Samhitâ as creeping amidst grasses of which five species are named in R. V. i 191, 3. There was also the sharply-stinging scorpion (A.V, xii, 1 46 ; vii, 56, 6, 8) ; worms of various kinds born in the rainy season (A. V. xii 1, 46) and the sharply-biting mosquito (A. V. vii 56, 3) are also mentioned.[1]

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[1] Iyengar's *Life in Ancient India*, pp. 23-27.

[2] See also *Atharva Veda*, x 4.

The following extracts are taken from the Atharva Veda :[2]

" Together, together let cattle flow (stream), together horses and together men, together the fatness that is of grain ; I offer with an oblation of confluence." [3] This is meant for safety and increase of kine.

" The eagle discovered thee ; the swine dug thee with his snout : smite the dispute, &c."[4] The object discovered by these animals is the root of a plant that is meant for victory in disputation which, for example, " Indra put on his arm in order to lay low the Asuras."

" Let the falcon lead hither from far the one to be called, living exiled in other's territory." [5] The falcon is thus a guide of the King to be restored.

" He who gives a white-footed sheep [6] commensurate with his world, he ascends unto the firmament, where a tax is not paid by a weak man for a stronger." By this offering of a white-footed sheep one is released from the payment otherwise due to Yama's councillors on admission into the other world. [Commensurate—(1) proportioned in value to the place in the heavenly world that is sought by the giver, (2) analogous with the world of light that is aspired to.]

" Both thy (two) eyes and thy mouth, O tiger,[7] we grind up ; then all thy twenty claws. * * * Ruined are the teeth of the beast ; crushed in also are its ribs." This hymn is against wild beasts and thieves.

" The draft-ox[8] sustains earth and sky ; the draft-ox sustains the wide atmosphere ; the draft-ox sustains the six wide directions ; the draft-ox hath entered into all existence. * * With his feet treading down debility, with his thighs extracting refreshing drink—with weariness go the draft-ox and the plowman unto sweet drink."

The hymn offers an example of that characteristic Hindu extollation, without any measure or limit, of the immediate object of reverence, which, when applied to a divinity, has led to the setting up of the baseless doctrine of henotheism.

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[1] Iyengar's *Life in Anc. Ind.*, p. 60.

[2] Harvard Oriental Series.

[3] Vol. 7, p. 66.

[4] Vol. 7. p. 67.

[5] Vol. 7, p. 88.

[6] Vol. 7, p. 136. See also the verses accompanying the gift of a bull, and the offering of a goat (Atharva ix 4, 5).

[7] Vol. 7, pp. 148-9.

[8] Vol. 7, pp. 164-166. For the extollation of the cow, see Atharva Veda x 10 ; and of the ox again, ix 7.

"With milk, with ghee, I anoint the goat,[1] the heavenly eagle, milky great; by it may we go to the world of the well-done, ascending the heaven, unto the highest firmament. * * * In the eastern quarter set then the head of the goat; in the southern quarter set his right side. In the western quarter set his rum; in the northern quarter set his other side; in the upward quarter set the goat's backbone; in the fixed quarter set his belly; midway in the atmosphere his middle. Do thou envelop with cooked skin the cooked goat, brought together with all his limbs, all-formed." The verses read as if the goat himself, after cooking whole, were set up in position, the head to the east.

"I have gone about the race of snakes,[2] as the Sun about the sky, as night about living creatures other than the swan; thereby do I ward off thy poison."

The birds of ill omen[3] against which incantations are used in the *Atharva Veda* are such "winged missiles" as the dove, the hawk, the owl. For the success of the horse in a race, we have the following verse: "The quickness, O courser,[4] that is put in thee secret, also that went about committed to the hawk, to the wind—with that strength do thou, O steed, being strong, win the race rescuing in the conflict." We have the terms dog[5] and falcon[6] applied metaphorically to the orbs of the celestial sphere also.

According to Mr. Bâl Gangâdhara Tilak, "of the various figures we may make out of the star in the constellation of Orion, *one* should be of an antelope's head."[7]

In the chapter on a picnic in Ancient India, Dr. Râjendralâl Mitra[8] refers to the buffalo-meat and game birds as *piece de resistance*: "In the time of the Rig Veda the meat was cooked with milk, and there is a passage in which Viṣṇu is described as carrying away the broth made of a hundred buffaloes and a hog (VIII 66, 10). Elsewhere it is said (VI 17, 11): 'For thee, Indra, whom all the Maruts, in concert, magnified Pushana and Viṣṇu cooked a hundred buffaloes.' * * * In the *Grihya Sutra* of Âswalâyana, partridges (*tittiri*) are recommended as appropriate for infants just beginning to take solid food, and ducks, doves, pigeons, and ortolans were formerly in common use."

(*c*) *Maurya Fauna.*

Mr. Manomohan Chakravarti has studied the rock-edicts and pillar-edicts of Piyadasi,[9] with special reference to the animal-lore contained therein.

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[1] Vol. 7, pp. 169-72.

[2] Vol. 7, p. 289.

[3] Book VI, xxvii—xxix.

[4] Atharva Veda, VI, 92. See also XIX. 25. "Be thou an up-carrier uphill."

[5] *Ibid*, VII, 80.

[6] *Ibid*, VII, 41.

[7] *The Orion* (Bombay, 1893), p. 101.

[8] Indo-Aryans Vol. I, pp 4, 27-28. See also Beef in Ancient India, pp. 354-382.

[9] See Memoirs of the Asiatic Society of Bengal, Vol. I, 1905-1907, pp. 361-374. See also Law's *Studies in Hindu Polity* and the *Artha Sástra* of Kautilya, for the names of the fauna very familiar in Maurya times (4th—3rd cent. B. C.).

Megasthenes' account of "gold-digging ants" in India has been already referred to. His Fragments supplies us with more solid information about Indian Fauna.

The use of horses and elephants for the army has been described by Megasthenes also. We know of this from Strabo (XV i 50-52) and Ælian (His. Animal XVI—10).

The training of horses has been likewise referred to in the *Fragments* of Megasthenes.

The information about elephants is copious in the *Fragments.* We learn from it of the methods of capture, training, medical treatment, &c. (Arrian, XIII, XIV; Ælian XII—44. XIII—71).

Some of the wild Fauna of the 4th century B. C. are to be known from Strabo's account (XV i 47) as well as that of Ælian, Pliny, &c., derived from the *Fragments.*

The generic names of the Inscriptional Fauna are: (i) Jîvâni, (ii) Prâna-sata-sahasrâṇi, (iii) Bhûtânâm (iv) Jâtâni, (v) Pasu-cikicchâ.

The following classes of animals are mentioned in the Rock-Edicts: (i) Dupada-catupadesu pakhi-vâlicalesu, (ii) Catupade, (iii) Macche.

By Edict No. I Asoka, the benevolent Cæsaro-papist of India, forbade the general destruction of life both in his own kitchen and in his empire. Two animals are specified: (1) Peacock (morâ, majurâ, majulâ), (2) Deer (mago, mrugo, mige).

By the Edict No. V the slaughter of the following born beings was prohibited:

(1) Parrot (suku).
(2) Starling (sâlikâ).
(3) Alune (unidentified).
(4) Ruddy goose (cakavâke).
(5) Goose (hamse).
(6) Nandi mukhe (unidentified).
(7) Gelate (unidentified).
(8) The bat (jâtukâ).
(9) White ant (ambâ papilikâ).
(10) Female tortoise (dâdi).
(11) Boneless fish (anaṭhika macche).
(12) Veda veyake (unidentified).
(13) Gamgapupuṭake (unidentified).
(14) Skate fish (samkuja macche).
(15) Tortoise porcupine (kaphaṭa sayake).
(16) Squirrel (pannasase).
(17) Simale (Sansk. *Srimara*)
(18) Bull (samdake).
(19) Okapinde (godhâs?)

(20) Rhinoceros (alasate).
(21) Pigeon (seta kapote).
(22) Goat (ajake).
(23) Sheep (edake).
(24) Pig (sukali).
(25) Fowl (vadhikukute).
(26) Elephant (nâga-vanasi).
(27) Cow (gone).
(28) Horse (aswasâ lakhane).

(*d*) *The Fauna in Hindu Folk-lore.*

The intimate familiarity of the people of Hindusthan with the topics generally treated in Descriptive Zoology or Natural History is also borne out by the existence of innumerable legends, both secular and religious, with animals playing a prominent part as *dramatis personæ*, and as narrators, or forming the subject matter, which entered into the curriculum of studies in ancient and mediæval India. We have already noticed the indebtedness of Europe to India in this branch of literature in connection with the legends of precious stones and metals.

The following extracts from Fausboll's *Indian Mythology* give a short account of such stories: "India has long been looked upon as the *cradle of fairy tales and legends*, and such is indeed the case, for beside numbers of short folk-stories, such as *Vetâla-panchavimsati* (25 Tales by a ghost), *Sukasaptati* (70 Tales by a parrot), *Simhâsana-dwâtrimsati* (32 Tales by Images on Vikramâditya's Throne), and, beside those found spread throughout the Mahâbhârata and Râmâyana and in fact in all Indian literature, we have the following important collection of fables, fairy stories and tales: (1) The *Jâtaka* books concerning the Transmigration of soul from about 477 B.C., (2) the *Panchatantra*-book in 5 chapters by Visṇu Sarmâ from about 530 A. D., (3) *Hitopadesâ*,[1] the Benefical Instruction by Nârâyaṇa, (4) *Kathâsaritsâgara*, the Lake of the Legend streams by Somadeva from about 1063, (5) Kṣemendra's *Avadâna-kalpalatâ*, (6) *Kathâkosa*, a Treasury of Tales.

"To these must be added from more modern times: (1) Frere: *Old Deccan Days*, or Hindu Fairy Legends; (2) Stokes: *Indian Fairy Tales*; (3) Lal Behari De: *Folk-Tales of Bengal*; (4) Steel and Temple: *Wide Awake Stories, Bombay*; (5) Temple: *The Legends of the Punjab*; (6) Knowles: *Folk Tales of Kashmir*; (7) Swynnerton: *Indian Nights' Entertainment*, or Folk Tales from the upper Indus; and from the latest date many stories communicated in the periodical: Indian Antiquary."

To this second list we have to add at least one which has been appreciated by literary connoisseurs as rivalling the merits of the *Arabian Nights*. This is the *Folk Tales of Hindusthan* by Shaikh Chilli[2] (Pāṇini Office.)

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[1] See the discussion of date and authorship in Peterson's Preface to Hitopadesa in Bombay Sanskrit Series No. XXXIII.

[2] *Nom de plume* of Sris Chandra Vasu, the versatile Sanskrit scholar and Hindu philosopher.

The *Hitopadeśa*,[1] which draws considerably upon Buddhist Jâtakas and Panchatantra, consists of 42 fables in four chapters, and of these 31 deal with animals. The table of contents in this book of stories gives the following topics of animal lore:—

CHAPTER I.

The acquisition of friends.

Fable I.—The story of the Crow, the Tortoise, the Deer, and the Mouse; Story of the Pigeons.
II.—The Old Traveller and the Tiger.
III.—The Deer, the Jackal, and the Crow.
IV.—The Blind Vulture, the Cat and the Birds.
V.—History of the Mouse Hiraṇyaka.
VI.—The Huntsman, the Deer, the Boar, the Serpent, and the Jackal.
VII.—The Jackal and the Elephant.

CHAPTER II.

The separation of friends.

Fable I.—The Story of the Bull, the two Jackals, and the Lion.
II.—The Ape and the Wedge.
III.—The Thief, the Ass, and the Dog.
IV.—The Lion, the Mouse and the Cat.
V.—The Crow, the Golden Chain, and the Black Serpent.
VI.—The Lion and the Rabbit.
VII.—The Lapwing and the Sea.

CHAPTER III.

War.

Fable I.—The Story of the Geese and the Peacocks.
II.—The Birds and the Monkeys.
III.—The Ass in a Tiger's Skin.
IV.—The Elephants and the Rabbits
V.—The Goose and the Crow.
VI.—The Quail and the Crow.
VII.—The Blue Jackal.

CHAPTER IV.

Peace.

Fable I.—Continuation of the Story of the Geese and the Peacocks.
II.—The Turtle and the two Geese.
III.—The three Fishes.
IV.—The Cranes and the Weasel.
V.—The Mouse and the Hermit.

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[1] Translation by Francis Johnson (Allen & Co., London, 1848). For a comparative study of Jâtakas, Panchatantra and Hitopadesa, see Peterson's Edition of Hitopadesa, *Bombay Sanskrit Series*, XXXIII (1887).

VI.—The Crane and the Crab.
VII.—The Brahmana and his Goat.
VIII.—The Camel, the Crow, the Tiger, and the Jackal.
IX.—The Old Serpent and the Frogs
X.—The Brahmana and his Weasel.

The stories in the Jâtakas, Panchatantra, Hitopadesa, and other works introduce us, on the one hand, to the actual manners and morals, political and social ideals and institutions, as well as intellectual condition and educational system of the people of Hindusthan, in ancient and mediæval times. On the other hand, they furnish living proofs of the minute Nature-studies in general, and the sympathetic observation of Zoological phenomena in particular, undertaken by the scholars, *litterateurs* and educators of those days.

The importance of these stories in world's literary history is thus described by Charles Wilkins in the preface to his "Fables and Proverbs from the Sanskrit" (1787), quoted by Peter Peterson in the Bombay Sanskrit Series, XXXIII:—

"* * * These celebrated fables, which, after passing through most of the oriental languages, ancient and modern, with various alterations to accommodate them to the taste and genius of those for whose benefit or amusement they were designed, and under different appellations, at length were introduced to the knowledge of the European world, with a title importing them to have been originally written by Pilpay, or Bidpai, an ancient Brahman. Sir William Jones * * in an elegant discourse delivered by him on the 26th February, 1786, * * expresses his sentiments upon this subject in the following words:—

'Their Nitisâstra or system of Ethics, is yet preserved and the fables of Vishnu Sarma, whom we ridiculously call Pilpay, are the most beautiful, if not the most ancient, collection of apologues in the world. They were first translated from the Sanskrit (into Persian) in the sixth century by the chief physician and afterwards the Vizier of the great Naushirwan and are extant under various names[1] in more than twenty languages."

(*e*) *The Sacred Fauna.*

The consecration of animals to gods and goddesses as well as the deification of Fauna are two important features of Hindu religious system. These have left their mark on the literature, sculpture and architecture of ancient and mediæval India, and point to the copiousness as well as popularity of Zoological lore among the Hindus.

Like the stones such as Sâlagrâma, and plants such as Tulsî, Marmelos ægle, Ficus religiosa, Jonesia asoka, Acacia suma, Calotropis gigantea, &c., the animals famous in Hindu religious history and art are many.

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[1] The whole subject has been treated in Max Müller's Essay on the *Migration of Fables.* It has to be noted that both Wilkins and Jones were mistaken in considering *Hitopadesa* to be the original work translated into Persian in the 6th century, while in reality the source-book that has been a literary link between the East and the West for centuries is *Panchatantra.*

Of all animals the cow is the most sacred. It typifies the all-yielding earth. All agricultural labour depends on the ox, for no such animal as the cart-horse exists in India. There is a typical 'cow of plenty,' *Kâmadhenu*, supposed to yield all desired objects, images of which are commonly sold in the bazaars, and bought as objects of reverence; and the letting loose of a bull (*Briṣotsarga*) —properly stamped with the symbol of Śiva—in sacred cities like Benares and Gaya, that it may be tended and reverenced by pious persons, is a highly meritorious act.

Serpents, also, are divine animals; they are emblemical of eternity, and are often associated with the gods, especially Śiva. Moreover, a curious race of serpents, half human, half divine, called Nâgas, is supposed to exist in regions under the earth. They are ruled over by three principal serpents named Śeṣa, Vâsuki, and Takṣaka.

Monkeys, a whole army of which aided Râma in his conquest of Ceylon, are of course amongst the most sacred of animals. They are inviolable and never under any circumstances to be molested.[1]

The insignificant tiny creature, squirrel, whose labours of love in the construction of the famous bridge are believed to have been appreciated by Râma himself, also, belongs to the same category.

In his work on Indian Mythology[2] according to the Mahâbhârata, Mr. Fausboll gives the following account of the nâgas or serpents. " They dwell in the bowels of the earth in Nâgaloka, which is endless, aparyanta, crowded with hundreds of different kinds of palaces, houses, towers and pinnacles, and strewn with wonderful large and small pleasure-grounds. The serpent world is likewise called Pâtâla. They also live in caves, in inaccessible mountainous regions, and are even said to be found in the valleys, in Kurukṣetra, on the banks of the river Ikṣumati, in the Naimiṣa forest on the shores of the Gomati, in numbers on the northern banks of the Ganga and in the Nisadha (mountain districts). * * * They are possessed of great strength, have a big body, are frightful, very quick, very violent. They are provided with tusks full of poison. They are handsome, take many shapes and wear showy ear-rings. * * * Some have 3, others 7, and others again 10 heads, etc."

Hamsas or ganders are the animals sacred to the four-faced god Brahma,[3] whose floral emblem is a lotus; for " his chariot, vimâna, which is as quick as thought, is harnessed with hamsas."

The brother of Aruṇa, the Sun-god's charioteer, is Garuḍa (the king of birds), called also Suparṇa, because of his handsome feathers. The story of his birth is narrated in the Mahâbhârata (I, 1073). He has serpents for food, and is the sign or standard of the god Viṣṇu. From him are descended all serpent-eating birds[4] who worship Viṣṇu as their great protector. The serpent called Śeṣa or Ananta is also sacred to Viṣṇu, for it is his couch or bed on which Viṣṇu rests in Yoga sleep.

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[1] Hinduism (1877), by Prof. Monier Williams, pp. 169-170.

[2] London : Luzac & Co., 1903.

[3] Fausboll's Indian Mythology (Luzac), p. 74.

[4] *Fausboll's Indian Mythology, pp. 77-80.*

The animals famous in the Indra-cult are the elephant, the horse and the cow. Indra's beautiful and always victorious elephant, who stands at the entrance to Swarga, is called *Airâvata* and has four tusks. His horse *Uchchaisravas* came forth under the churning of the ocean, and is white with a black tail. His chariot is drawn by 10,000 reddish-yellow horses. Nandini[1] or Kâmadughâ is Indra's 'wishing cow,' who grants all wishes and is the daughter of Dakṣa Prajâpati.

The Varâha or boar is the animal in whose form the god Viṣṇu had to embody himself in order to save the earth from the waters of a deluge which had completely enveloped it. The story of this avatâra or incarnation is thus given in the Mahâbhârata (III, 15826): "He thought of the shape of a boar, which animal loves to play in the water. And when he had given himself a boar's body that could speak and which agreed with the traditions of the Vedas, ten yojanas broad and a hundred yojanas long, resembling a great mountain in shape, shining with sharp tusks, thundering like a mass of clouds, and resembling a dark cloud, then the Lord descended like an offering-boar into the water, drew the earth up with one of his tusks and set it back in its place."

Among the ten incarnations of Viṣṇu adopted by Him on the occasions of cataclysms three are animal forms, *e.g.*, those of the *matsya* or *mina* or Fish, *kurma* or Tortoise and *varâha* or Boar; and a fourth is half-animal, half-human, *e.g.*, man-lion or *Narasimha*. The "horse's head-incarnation called the *aswasiras avatâra* is mentioned in the Mahâbhârata only (XII, 13478) and does not belong to the traditional list of 10 known to the latter-day Hindus. Again, according to the Mahâbhârata[2] "the Matsya-incarnation is referred to Brahmâ, and the Kurma-incarnation has no connection with Viṣṇu"

In any case, there is no doubt that in Hindu mythology the Fauna are important enough to have contributed at least three of the ten important forms for the embodiment of the Divinity in times of sore distress for mankind and creation. We have to notice, further, that Yama, the Death-god, has two four-eyed dogs, that Śiva is clothed in tiger-skins, and has, for his conveyance, a white bull with a huge body, thick neck, broad shoulders, that the goddess Durgâ stands on the lion as vâhana or bearer and overpowers the mahiṣa or buffalo, that the alligator is sacred to the goddess Gangâ, the tortoise to Yamunâ, that the six-faced war-god Kârtika rides on a peacock, that the god of success, Gaṇeśa, has the mouse for his embem, and the owl is sacred to Lakṣmi, the goddess of fortune.

Among the Vedic deities, also, we find the same recruitment of conveyances or emblems or signs from the animal world. Thus Pushan[3] is the "herdsman who drives the cattle with an ox-goad and rides on a goat."

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[1] *Ibid*, p. 82-90. The story of Nandini has been popularised in the first two cantos of the immortal *Raghuvamsam* of Kâlidâsa.

[2] Fausboll's Indian Mythology, pp. 120-122.

[3] Oppert's *Original Inhabitants of India* (Constable & Co., Westminster, 1893), p. 276.

(*f*) *The Fauna in Hindu Art.*

Indian art also bears impress of the animal lore of the Hindus. This is natural, since the fauna, being important elements in Hindu religion, cannot but influence the art and literature that have always been associated with it. Architecture, sculpture and painting have in all ages and climes been hand-maids to mythology. The history of Hindu art is no exception to this. Furthermore, we have to notice that art and literature have had their careers independent of religion also, both in the East and West, embodying the thousand and one feelings, sentiments, ideals, aspirations, &c., of a non-religious or secular order.[1] Indian Fauna and animal-lore have left their deep marks on both the religious and secular branches of Indian art; and this is another testimony to the Hindus having cultivated their powers of observation with reference to Natural History.

We have seen that mammals, aves, pisces, and reptiles of the Vertebrate Kingdom have all contributed to the mythology of the Hindus. As might be expected from the tendency of the Hindu mind to give concrete shape to all transcendental or spiritual ideas and embody every sentiment in images, all these phyla of the animal would have their specimens in the religious sculpture or plastic art as well as painting of Hindusthan. The animal vâhanas or vehicles and symbols of the gods and goddesses have ever been the handiworks of painters and sculptors,[2] along with their lords, in stone or bronze or other materials as the case may be.

Architecture also testifies to the prevalence of animal motif in Hindu art. In his essay on the architecture of the Hindus[3] Mr. Ram Raz, Judge and Magistrate of Bangalore, says: "In the existing treatises on Hindu Architecture, no mention is made of anything like a substitution of human figures for columns to support the entablature, but the shaft is directed to be adorned with the figures of demons and animals; yet various examples are to be met with in which human figures, as well as representations of animals, are employed in bold relief in the sides of pillars in temples and porticoes, but by no means like those found in Egyptian architecture. The antiquity of this invention in India is not determined."

The following are the remarks of Dr. Mitra[4] on the representation of animal figures in Orissan Sculpture: "The Uriyas did not prove unequal to the task. They made considerable progress in it, and displayed much tact and

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[1] Mr. Vincent Smith, however, commences his monumental work on the history of Indian art with the hypothesis that "Indian art is the slave of religious tradition," though the innumerable specimens of sculpture and painting described and illustrated by him as well as other art-historians and art-critics bring out the secular aspects in uncertain light and give the direct lie to the statement.

[2] See Fergusson's *History of Indian Architecture*, Havell's *Indian Sculpture and Painting* and *Indian Architecture*, Vincent Smith's *History of Fine Art in India and Ceylon*.

[3] Published for the Royal Asiatic Society of Great Britain and Ireland in 1834.

[4] Indo-Aryans, Vol. I, pp. 99-101.

ingenuity. In my work on Orissa reference has already been made to their life-like pictures of monkeys, and the success with which sensuous passions have been shown in them. The elephant has also been carved and chiselled with great skill. The horse at the southern gate of the Konârak porch is remarkably well-proportioned, and representations of rats, parrots, geese, goslings, deer and other animals shown in the illustration annexed to my work on Orissa will be generally acknowledged to be pretty close imitations of nature. A colossal bull in the enclosure of the Great Tower is also worthy of note as a specimen of well-finished animal carving. The lion among animals is, however, invariably ill-carved. It has everywhere a conventional, unnatural half-dog half-wolf look about it.

"* * It is generally representsd as trampling on an elephant about one-half to one-sixth of its size, crouching under its foreleg. Looking at groups like these, and the marked disparity in the size of the two animals, I am disposed to think that the lion had become extinct in Orissa when the sculptures were made, and the artists had to depend upon tradition and their imagination to produce its likeness. This inference receives some support from the fact of the lions in the Udayagiri bas-reliefs being much better-shaped; and they, it is to be presumed, were delineated when the animal was common in the country. * * Winged bulls and lions are unknown in Orissa."

Animal-life has been portrayed and perpetuated in and through the medium of other forms of Hindu art also, *e.g.*, industrial arts, handicrafts, etc., that minister to the purposes of commerce or domestic life. Such animal figures are those to be met with as decorative or ornamental devices on textile and silken fabrics, carpets, ivory carving, metallic bas-reliefs, earthen, wooden, and stone vessels, &c. In his paper on the *Religious Element in the Arts and Crafts of India* in the Modern Review for March, 1913, Prof. Radhakamal Mookerji gives a detailed account of some of these 'motives': "Among birds the most frequent are the peacock and the paroquet represented in wood-carving as well as in textiles. In the textiles the birds are placed usually head and tail in the vertical bands and in the transverse ones with each alternate bird looking over its shoulder." According to *Yukti-kalpataru*, "the prows of ships admit of a great variety of fanciful shapes or forms: these comprise the heads of lion, buffalo, serpent, elephant, tiger, birds such as the duck, pea-hen or parrot, the frog."

The following extract from Vincent Smith's[1] *History of Fine Art in India and Ceylon* gives a general account of 'animal motives' in Hindu Sculptures and Painting: "The Indian treatment of indigenous animals in both sculpture and painting is as original and artistic as that of plant motives."

"You have only," Sir George Watt writes, "to look at the plants and animals employed in the most ancient designs to feel the strong Indian current

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[1] Chapter XI, p. 388. See also the illustration of "antelope frieze" on p. 192, 'Colossal horses' on p. 195, Elephant colossus on p. 196.

of thought there conventionalised, which must have involved centuries of evolution. The treatment of the elephant, monkey and serpent is Indian, and in no way Greek. No Grecks (as few Englishmen to-day) could give the life touches of those animals seen on all the oldest sculptures and frescoes."

" These observations are perfectly true, and in all discussions of the foreign elements in Indian art we must remember that in certain respects Indian artists were not only free from obligation to the Greeks but actually superior to them. The illustrations in the work bear abundant testimony to the Indian power of delineating indigenous living forms, both vegetable and animal. The Gandhara treatment of the elephant is inferior to that of the same subject by the artists of the interior, who were more familiar with the wonderful beast, which is not easy to model or draw well."

Mr. Vincent Smith's monumental work furnishes several pictures of animal-life in Hindu art. We mention here the tortoise sacred to the goddess Yamunâ. There are two[1] pieces of exquisite workmanship upon this subject which have been admired by connoisseurs. " The unsurpassed skill of the Hindu lapidaries in working the most refractory stones is best exemplified by the great jade (or ? jadeite) tortoise, found many years ago in the bank of the Jumna near Allahabad. * * * Mr. King observes that ' for fidelity to nature and exquisite finish it is worthy of the ancient Greeks.' Again, the tortoise in ivory, produced about 1830 by Gobind Ratan of Nayagarh in Orissa, is described by Sir George Watt as a " wonderful creation," which raises the artist who produced it to a position of " equality with the ivory carvers of Europe, Japan or China."

The ' Rider motive '[2] is thus described by Mr. Smith : " At Amaravati and in Gandhara a favourite subject is the departure of Gautama Buddha as Prince Siddhârtha from Kapilavastu on horseback. Generally the horse is shown in profile, but occasionally is represented as emerging from a gateway, and facing the spectator, fore-shortened."

Specimens from the earliest Hindu Paintings in which animal-life has been perpetuated have been also described and illustrated by Vincent Smith. The oldest painting found in the Jogimara cave of the Ramgarh Hill in Orissa belonging probably to 2nd cent. B. C., presents before us elephants, and a chariot drawn by horses. Among the infinite subjects and decorative designs in the Ajanta Paintings (5th—7th cent. A.D. ?) in which " fancy is given full play, simplest objects of nature being pressed into the artists' service," we find panels "with animals combined with lotus, drawn with remarkable fidelity and action, as the elephant, humped bull, and the monkey; parrots, geese, and conventional birds, singly and in pairs, with foliated crests, and tails convoluted like heraldic lambrequins, showing the upper and under surface of the ornament."

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[1] See the illustrations on pp. 357 and 373 of *Smith's Hist. of Fine Art.*

[2] *Ibid*, p. 382.

The picture of fighting bulls is one of considerable interest not only as displaying the artists' command over the manifestations of life, but also as supplying a convention and motive in Indian art-history. The following is the note of Mr. Smith on the one in Ajanta Paintings : "Its treatment proves the artists' knowledge of animal form and his power of expressing vigorous action[1]. The same subject, with variations of detail, is treated in a sculpture at the ancient cave of Bhâjâ, dating from about the beginning of the Christian era, and again in a sixteenth century painting at Akbar's Capital, Fatehpur Sikri."

Three notable paintings have elicited special admiration of Mrs. Herringham :[2] "They are (1) a hunt of lions and black buck, (2) a hunt of elephants, (3) an elephant salaaming in a king's court. These pictures are composed in a light and shade scheme which can scarcely be paralleled in Italy before the 17th century. The whole posing and grouping is curiously national and modern, the drawing easy, light and stately, and the painting suggestively laid in with solid brush strokes—in the flesh, not unlike some examples of modern French painting. The animals—horses, elephants, dogs and black buck—are extremely well drawn."

Two colossal horses at Konârak in Orissa have called forth the following remark of Havell which is considered by Vincent Smith[3] as hyperbolical : "Here Indian sculptors have shown that they can express with as much fire and passion as the greatest European art the pride of victory and the glory of triumphant warfare ; for not even the Homeric grandeur of the Elgin marbles surpasses the magnificence of movement and modelling of the Indian Achilles, and the superbly monumental horse and its massive strength and vigour are not unworthy of comparison with Verrochio's famous master-piece at Venice."

The "plunging horse"[4] in the famous choultry at Madura is of interest as being both a fine piece of work in bronze and also a miniature reproduction of a characteristic type of South Indian sculpture in stone.

The fish-motif in Hindu art has been thus described by Havell in *Indian Architecture* :[5] "When used to represent the aura in a sculptured or painted figure of Buddha, the lotus leaf was generally associated with the *makara* (alligator ?), a kind of fish dragon, the fish being an emblem of Kâma, the God of Love and of fertility. The fish was also a sign of good luck, for in the Indian legend of creation it was a fish that saved Manu, the progenitor of the human race, from the flood. This form of aureole, with the makara and lotus leaf combined, is still a tradition with Saivite image-makers in Southern India."

The same writer in his *Ideals of Indian Art*[6] describes the characteristic Hindu feeling of reverence and love of nature, both animate and inanimate, as a spontaneous concomitant of the cult of *Bhakti* or the way of Faith (including Hope and Charity), one of the three traditionally recognised paths to salvation in Hindu metaphysics. The Hindu conception of the reciprocity of Man and Nature, the doctrine of the participation of the whole Creation in the joys and sorrows of man, the philosophy of the incompleteness of the one without the other, and the idea that Nature is not a mere background to display man in relief, that even dumb animals have a place in the heaven, are the eternal tenets inspiring every work of the Hindu—in his mythological creation of the abodes of the gods, in his literary master-pieces, and in his finest art-products. Havell illustrates the idea by the story of the faithful dog, in the Mahâbhârata, without which Yudhisthira refused to enter Paradise and care for his own salvation, the participation of all Nature—cows, elephants, lowly bush, gay birds—in the entreaties of the sorrowing citizens of Ayodhyâ on the occasion of Râma's exile, and by the invocation of Sîtâ to the spirit of the lordly peepul tree (*Ficus religiosa*) when the edge of the forest was reached, and also by the compassionate caressing of the faithful horse Kamthaka by Buddha on parting from the "noblest of steeds." We may add also the scene described by Kâlidâsa in canto XIV of Raghuvamsam where Universal Nature—the very deity of Forests—began to wail with Sîtâ when she was deserted near Vâlmîki's forest and given Râma's mandate by Lakṣmaṇa.

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[1] *See illustration on p. 283.*

[2] *Quoted by Vincent Smith, pp. 293-94.*

[3] *Hist. Ind. Fine Art, pp. 195-196.*

[4] *Ibid* p. 240.

[5] P. 82.

[6] Pp. 107-112.

The theory of animal *motifs*[1] in Hindu art is thus explained by Havell: "It is not the ignorance and superstition of the primitive savage, but a firmly-rooted belief in the doctrine of re-incarnation and in the immanence of God, which makes the Indian express so reverently and worshipfully his intimate fellowship with all created things. * * * Gautama himself had passed through all forms of life, and in the tree, worm or insect, or in the beast of the field there might still dwell the soul of Buddha that is to come. * * * In the sculptures of Sanchi and Amaravati he (the artist) shows the wild elephant coming to pour libations over the sacred tree under which the Buddha sat, and all the denizens of the forest join with their human fellow-creatures in adoration of Buddha's footprints, his begging bowl or his relic shrines."

The note to plate IV in Dr Coomâraswâmy's explanatory introduction to his *Selected Examples of Indian Art*[2] deals with a characteristic treatment of animals in Hindu paintings, and *pari passu* presents before us a peculiar tenet of the philosophy of Hindu music. According to the Hindu, modes of music, like all moral, spiritual, intellectual or physical attributes and qualities of man, are the "manifestations and perceptible forms of certain musical beings," the 'Geniuses' called Râgas (male) and Râgiṇîs (female)

The tendency of Hindu genius to personify, iconise and tender homage to the creation of religious imagination is manifest in the conception of music, as of *vidyâ* or learning, *lakṣmî* or wealth, *sakti* or prowess, and so on. The *Râgiṇî Tori* is thus described in an old Rajput book on music, with illustrations as well as descriptive verses, called *Râga-Mâlâ*, or 'Garland of Râgas,' a copy of which belongs to Mr. Gaganendranâth Tagore of Calcutta : "Having a shining snow-white form, white as the *kunda* flower, scented with Kashmiri camphor, Tori, embowered in the woods, charmeth the deer with the honeyed sweetness of her vinâ's sound." "The introduction of animals attracted by music," says Coomâraswâmy "is a motif found also in other Râgiṇî pictures. This orphic motif occurs also in the Lailâ-Majnun pictures, where the animals come to hear the songs of Majnun, and in Kriṣṇa pictures, where the cows are represented as rapt by the sound of Kriṣṇa's flute."

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[1] Read in this connexion "Hindu Ideals—An Appreciation," being the Inaugural Address delivered by Dr. Brajendranath Seal, as King George V Professor of Philosophy in the University of Calcutta.

[2] Essex House Press, Norman Chapel, Broad Campden, Gloucestershire, 1910.

Referring to the folk-element[1] in Rajput art, especially Pâhâri Drawings, the same art-historian and art-critic remarks : "In the hill drawings, the influence of the folk appears directly in the constant emphasis laid on pastoral life, not merely in set pictures of Kriṣṇa as the divine cowherd, but in more naive sketches which reflect the everyday life and environment of peasants. Fig. 1. inscribed Sri Kriṣṇa, milkman, affords a good example of this. Another drawing represents a girl looking up at a crow perched on a roof."

The animal motifs in Rajput art have been described with illustration by Coomâraswâmy in his two series of Indian Drawings. Here we meet with cheetah attacking a deer ; frisky cows ; cow and calf ; cow with anklets, bell and plume ; lion attacking man and deer ; lynx and deer ; running elephant ; Himalyan sheep ; leopards fighting ; grasshopper ; leopard and deer ; four deer ; three lions ; buffaloes ; lion and rhinoceros ; running deer ; partridge ; the divine cowherd ; lions.

The following is taken from the *Indian Drawings* Series I (p. 18) ; "The drawings of animals are amongst the most accomplished and most perfect examples of Indian art of the 17th century. How far the tradition of animal drawing is at all Persian, and how far indigenous it is difficult to say. It is certain that we find very good and vital drawings of animals in the quite purely Hindu work of the Tanjore School, and also that, whereas in Persian paintings wild animals are regarded as creatures to be hunted rather than understood, in Indian work their own specific and even individual character is delineated as affectionately as in the case of the portraits of human beings. The elephant is drawn with special knowledge and skill. * * * The runaway buffalo has all the vitality and vigour which we find in the finest of Japanese animal drawing, while the somewhat demure satisfaction of the tame rhinoceros with bells round its neck is altogether delightful. The rendering of movement in the drawing of four running deer is particularly good ; almost equally so is the slow nibbling progress of two Himalayan sheep. * * * The little drawing of a grasshopper shows that the smaller creatures were not forgotten. The drawing of a partridge recalls the beautiful bird-studies of Durer. Some

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[1] *Indian Drawings* Series, II, p. 13 (India Society, London, 1912).

of the best animal drawings are those representing the capture of one animal by another, or the set fight between two animals."

(g) *Varâhamihiran Fauna.*

The *Brihat Samhitâ* of the 6th century A.D. is rich in animal-lore—the accounts of what has long been known as Natural History—and devotes several chapters to a description of the features of cows, oxen, dogs, cocks, turtles, goats, horses, and elephants. Chapter LXI begins thus: "All that Parâśarâ told Brihadratha about cows and oxen, I shall briefly state here. I shall, however, treat scientifically of the animals possessing good features."

The following enumeration is taken from Chapter LXXXVI:—"Creatures remarkable for speed, genius, strength, place occupied, merriment, nobleness of mind or good sound are strong when in their own places; the same rule applies to useful animals.

"The cock, the elephant, the peacock, the vanjula, the musk-rat, the duck and the kutapoori are strong in the east. The jackal, the owl, the haritâla pigeon, the crow, the ruddy goose, the bear, the ichneumon, the dove—are strong in the south.

The ram, the swan, the osprey, the partridge, the cat are strong in the west. The crane, the deer, the rat, the antelope, the horse, the cuckoo, the blue jay and hedgehog are strong in the north."

Varâhamihira classifies the Fauna according to habits of life thus:—

(1) The Indian cuckoo, the hog, the sasaghna, the vanjula, the peacock, the sreekarṇa, the Brahmani duck, the blue jay, the andiraka, the parrot, the crow, the dove, the skylark, the wild cock, the osprey, the vulture, the monkey, and the sparrow are day birds and animals.

(2) The jackal, the pingala, the chippika, the flying fox, the owl and the hare are night birds and animals.

(3) Horses, serpents, camels, leopards, lions, bears, inguanas, wolves, mungoose, deer, dogs, goats, cows, tigers, swans, antelopes, stags, hedgehogs, cuckoos, cats, cranes and pigeons are both day and night animals."

The various cries of animals, of both good and bad omen, have been enumerated in Chapter LXXXVIII.

In describing the methods of interpreting these cries, Varâhamihira adds the note that "birds and animals bear different names in different countries; and hence the animals shall first be identified from their names."

The omens connected with animals, regarding not only cries, but habits, habitats, features, limbs and movements, have been elaborately described in Brihat Samhitâ, and, in fact, form the subject matter of several chapters. Thus

Iyer's *Brihat Samhitâ* Part II, pp. 91-99.

Ibid Part II, pp. 180-1.

Chapter LXXXIX is devoted to the omens connected with the dog, the next chapter begins with the statement that "all that has been said of the dog applies also to the jackal, but there are a few special points to be noted," and gives the various malefic cries of the jackal. The omens connected with wild animals are described in the 91st chapter, and those connected with the cow, horse and elephant in the next three chapters respectively. The cawing of the crow has a large chapter (XCV) devoted to it. We read that "in the case of people inhabiting eastern countries, the crow on the right side indicates good luck; but the crowing of the crane indicates prosperity when on the left side. In other countries the case is otherwise. The limits of provinces shall be learnt from a general knowledge of the country.

(*h*) *Ayurvedic Fauna.*

The medical literature furnishes abundant proofs of the intimate acquaintance of the Hindus with all the features of animal organism, internal and external, as well as the principles governing animal life.

The animal kingdom has been utilised for the *Materia Medica* of the Hindus since very early times. The musk and the poisons of *cobra de capello* and of the snake-eating black cobra, are some of the animal-products used in medicine. The properties of the flesh of various kinds of animals have been discussed very elaborately in almost all treaties on Therapeutics.

The following is taken from Gondal's[1] *History of Aryan Medical Science*:

Asthi (bone) of a goat reduced to ashes, and formed into an ointment with other ingredients, is used for curing fistulæ. Cuttlefish bones are also used medicinally.

Danta (tooth) of the elephant is prescribed in leucorrhea.

Dugdha (milk) is nutritive and vitalising. Human milk * * Cow's milk * * Goat's milk * * Sheep's milk * * Elephant's milk * * Ass's milk * * Camel's milk.[2] * * The properties of milk are said to vary according to the colour of the animal and the qualities of the pasture.

Garala (poison) of snakes is used in dropsy.

Meda (fat) of camels and hyenas is considered a valuable local remedy for gouty joints.

Puchchha (feather) of a peacock is said to cure hiccough. It is also believed that snake-poison will not affect one wearing a ring made of copper extracted from peacock's feathers.

Sringa (horn) of a stag has various medicinal uses.

Gondal mentions also the medicinal virtues of cowdung, elephant's fimus, droppings of cocks and goats, conches, cowries, corals, biles of fish and other aquatic creatures, nails, and urine of cows, horses, camels, elephants, goats,

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[1] Iyer's *Brihat Samhitā* Part II, pp. 196-97.

[2] Pp. 129-134 (Edition of 1896).

&c., skins of snakes, cob-webs of spiders, leeches, lac, honey, &c., used by the Hindu practitioners of the Ayurveda.

The Hindu Science of Toxicology, again, as one of the eight branches of the Ayurveda, recognised by Charaka, has largely drawn upon Animal-lore. "The treatment of poisons and their antidotes comes under the head of *Kalpa*. Poisons are of two kinds (1) *Sthâvara*, vegetable and mineral poisons; and (2) *Jangama*, animal poisons.[1] * * Jangama poisons include venoms of such animals as insects, scorpions, spiders, lizards, serpents, mad dogs, foxes, jackals, wolves, bears, tigers, &c. * * Both kinds of poisons are used therapeutically by the Hindus."

In his lecture at the *Sâhitya Sabhâ* of Calcutta, Dr. Gananath Sen referred to Hindu Toxicology in the following words: This "contains the treatment

(i) of the crude poisons—vegetable, mineral and animal (including extensive chapters on snake-bites and classification of snakes, &c.), and

(ii) of the microbic poisons, which, it is said, distinctly arise out of the contamination of air, water, and soil, and immunity against which was sought and partly attained.

The practice of appointing physicians skilled in Toxicology to accompany expeditions of large armies and to take charge of the king's kitchen-room was in vogue even at the time of Susruta. So late as in the reign of the kings of Gauḍa we find the relics of the practice in the fact that Chakrapâṇi Datta, the well-known physician and author of Bengal, describes his father as physician in charge of the royal kitchen."

Gondal also describes the indebtedness of Alexander (according to the Greek historian Arrian) to the Hindu Vaidyas in curing cases of snake-bite which defeated his Greek physicians. "In face of the fact that the European Toxicologists are still in search of a specific for snake-poison, the Indian physicians who lived some 2,200 years ago might well be proud of their skill."

It may be incidentally remarked here that it is only during the last two decades or so that snake-poison has been used as an article in western Materia Medica, whereas it has been a recognised drug among the people of Hindusthan from time immemorial. In noticing this superiority of Hindus over Europeans we are reminded of the remark of Dr. Uday Chand Dutt about the diffidence and caution of Yunani practitioners in the internal administration of mineral drugs in which the Hindus had been proficient:[2] "We cannot help admiring the ingenuity and boldness of the Hindu physicians when we find that they were freely and properly using such powerful drugs as arsenic, mercury, iron, &c., while the Musalman Hakims around them, with imperial patronage and the boasted learning of the west," were bold enough only "to use them as few as possible" and consider them to be "dangerous drugs."

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[1] Gondal's Hist. of Ary. Med., pp. 155-156.

[2] Preface to *Materia Medica of Hindus* (Second Edition, 1900), pp. xiv-xv.

According to Charaka,[1] "*Animals are divided into four classess* (1) Jarâyuja or Mammalia, (2) Andaja or oviparous, (3 Swedaja or those produced from animal excretions, as parasites, etc., and (4) Udbhijja or those produced underground or from vegetable matter, *e.g.*, ***indragopa***, a sort of red insect."

The following is taken from Part III of Dutt's ***Materia Medica of the Hindus***: "Leeches have been employed by the Hindus from a very remote period. Susruta gives a detailed account of their varieties, habits, mode of application, &c. His account of leeches has been translated in full by Dr. Wise. Pandit Madhusudan Gupta had also furnished a note on the subject for publication in the Bengal Dispensatory. There are twelve varieties of leeches, six of which are venomous and six useful. The venomous leeches are found near putrid fish or animals in foul, stagnant and patrescent water. The good leeches are found in clear and deep pools of water which contain water-lilies. The middle-sized leeches are the best. * * *

"The lac insect (coccas lacca) has been known to the Hindus from a very ancient period. The *Butea frondosa* is the principal tree in which lac is said to be produced. It is used in colouring silk. * * *

"Eight sorts of honey are described by Susruta; of these varieties, ***Mâkṣika*** (collected by the common bee), ***Bhrâmara*** (collected by large black bees), ***Kṣaudra*** (collected by small bees), and ***Pauttika*** (collected by small black bees resembling ants) are described by recent writers. * *

"The ***Bhâvaprakâsa*** describes three kinds of musk, ***viz***, Kâmarupa, Nepâla and Kâshmira musk. * * * In describing the properties of the flesh of various animals Sanskrit writers divide them into two classes, ***viz.***, ***Jangala*** or land and ***Anupa*** or water animals." Land-animals are sub-divided into eight classes, and water-animals into five. Thus we get the following classification :

I.—Jangala or Land Animals:

1. Jangala—living in forest; *e.g.*, deer, antelopes.
2. Vilastha—living in holes; *e.g.*, serpents, lizards, porcupines, &c.
3. Guhâśâya—living in caverns; *e.g.*, tigers, lions, bears, &c.
4. Parṇamriga—living on trees; *e.g.*, monkeys, squirrels.
5. Viṣkira—(birds) which take their food after tearing or scattering it; *e.g.*, peacocks, quails, partridges, &c.
6. Pratuda—(birds) which strike with their beaks; *e.g.*, pigeons, wagtails, cuckoos, &c.
7. Prasaha—birds of prey; *e.g.*, hawk, falcon, &c.
8. Grâmya—domestic; *e.g.*, ox, goat, horse, sheep.

II.—Anupa or Water Animals:

1. Kulechara—grazing in marshes; *e.g.*, buffaloes, yak, rhinoceros.
2. Plava—birds which swim in water; *e.g.*, geese, ducks, cranes, &c.
3. Kosastha—animals enclosed in shells; *e.g.*, conch-shells, bivalve-shells, &c.

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[1] ***Ibid***, p. 1.

4. Pâdina—footed animals ; *e.g.*, tortoise, crocodile, porpoise, &c.
5. Matsya—fishes.

The classification of Fauna adopted in the *Hârita Samhitâ* [1] in the chapters on flesh (XX—XXII), which enumerate and describe several species of animals, is as follows :

I. Chatuṣpada or Quadruped.

1. Ena.
2. Chitrânga.
3. Chhikkara.
4. Rohita.
5. Sukara (or boar)
6. Sasaka or hare.
7. Sallaka.
8. Salyaka.
9. Godha.
10. Musaka.

II. Sthalachara or Land Animals.

1. Lavaka.
2. Tittira (partridge).
3. Nîlamayura (peacock),
4. Dwitiya mayura.
5. Kukkuta (jungle fowls).
6. Kapota (pigeon).
7. Chakora.
8. Suka (parrot).
9. Sâri.
10. Krauncha (dove).
11. Kokila (cuckoo).
12. Vivritâkṣa.
13. Grihachataka.

III. Jalachara or Aquatic Animals.

1. Water-Birds.
2. Makara (alligator).
3. Matsya (fish).
4. Kachchhapa (tortoise).
5. Kulira (crab).

Regarding the knowledge of the Hindus about the internal morphology of animal-organism, the following extracts may be cited :—

"The Hindus could set fractures and dislocations in men and beasts. They were perfectly acquainted with the anatomy of the goat, sheep, horse and other animals used in their sacrifices. * * * The constant wars and internecine strifes afforded ample opportunities to the surgeons to distinguish themselves in their professions and acquire considerable dexterity in their work. * *

"In order to acquire dexterity in surgery the preceptors made their pupils practise different operations on various substances. * * Evacuating was practised on the urinary organs of dead animals ; [2] scarification on the fresh hides of animals on which the hair was allowed to remain ; venesection was practised on the vessels of dead animals ; application of caustics and the actual cautery on pieces of flesh. * * *

"Buddha and his followers [3] would not permit the dissection of animals. They put a stop to animal sacrifice, in which a knowledge of anatomy was indispensable and substituted models of dough."

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[1] See the Text edited by Kavirâja Binodlal Sen of Calcutta.

[2] Gondal, pp. 176-180. See Hœrnle's *Studies in Ancient Indian Medicine.*

[3] *Ibid*, pp. 185-186.

(*i*) *Fauna in Veterinary Literature.*

The very definition of the scope and province of Ayurveda[1] given by Charaka (Sutra-sthâna, Ch. XXX) "covers not only the medical science in its widest aspect including the veterinary science—specified as *Śâlihotra* and sub-divided into *Gajâyurveda* and *Aśwâyurveda*, but also certain phases of Psychology and Ethics on which long philosophical and instructive discourses are found in ancient Ayurvedic works."

The importance and antiquity of veterinary science in the secular literature of the Hindus have been noted by Gondal[2] also: "Hindu medicine was at the acme of its glory in the time of Râmâyana and the Mahâbhârata. To the court of every chief, great or small, was attached a physician. There were Army Surgeons and Court Physicians. * * Veterinary science seems to have been highly cultivated long before that period. Nala, a remote ancestor of the Pândavas, is described as a most accomplished horse-trainer, and as possessing a thorough knowledge of all matters relating to the horse. Nakula, one of the five Pândavas, was an expert in the veterinary science on which he has written several works, his *Aśwachikitsâ* being still extant. The science of treating elephants, bullocks, and other domestic animals, was and is still known in India. * * * Buddha established hospitals for men and beasts all over the country; and the institutes of Pinjrapoles (Animal Hospitals), so peculiar to India, owes its origin to him."

The existence of treatises in Hindu literature, specially addressed to the needs of the animal creation, is the strongest evidence of Zoological studies in ancient and mediæval India. It is quite natural that a veterinary science should have come into being as a differentiated and specialised branch of the general Ayurvedic literature of those days, since agricultural live-stock, draught cattle, cavalry, camel-corps, elephant-corps, &c., were the common features of the domestic, economic and political lives. Some idea of the secular activities and 'nature-studies' of the Hindus will be obtained from an account of their treatises on elephants and horses.

(*A*) *Pâlakâpya or the Science of Elephants.*

Treatises on elephants are known to be *Gajachikitsâ*,[3] *Gajavaidya*, *Gajâyurveda*, *Hastyâyurveda*, *Hasti-vaidyaka*, &c. The sage Pâlakâpya is by tradition known to be the originator of this science, which is not infrequently named after him. The antiquity of these works is to be inferred from the following note in Prof. Aufrecht's *Catalogus Catalogorum*, Vol. I (1891).[4] "Pâlakâpya is quoted by Kṣiraswâmin on *Amarakoṣa*, Hemâdri in *Vratakhanda*, *Sârangadharapaddhati* (p. 99),[1] and Mallinâtha."

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[1] Lecture delivered by Dr. Gananath Sen on *Medical Science in Ancient India* at the Sâhityâ Sabha of Calcutta in 1906.

[2] *Hist. of Ancient Aryan Medicine*, pp. 187-189.

[3] A fanciful name is *Gudhaprakâsikâ*. See Aufrecht, I, 140,

[4] P, 336.

The volume of literature on the subject would be apparent if we mention the various manuscripts referred to in the above 'alphabetical register[2] of Sanskrit works and authors.' The following account is based on that work.

A work called *Gajachikitsâ*, or 'Treatment of Elephants,' is to be found in the Catalogue of Manuscripts belonging to the late Pandit Radhakrishna of Lahore, who was famous not only for his enlightened views, but also for his great knowledge of Sanskrit lore.

Gajadarpaṇa and *Gajaśâstra* are quoted by Hemâdri, and Dinakara respectively on Raghuvamsam. *Hasti-vaidyaka* is a work by Virasena,[3] quoted by Bhattotpala on *Brihajjâtaka*.

Gajaparikṣâ is the name of a work in Oppert's List of Sanskrit MSS. in Private Libraries of Southern India (Vol. II, Madras, 1885). *Gajalakṣaṇa* or 'Characteristics of Elephants,' attributed to Brihaspati, is also to be found in Oppert's List, as well as in the Catalogue of Sanskrit MSS. in the Library of H. H. the Maharaja of Bikaneer compiled by Râjendralâl Mitra,[4] and in the Catalogue of Sanskrit MSS. existing in Oudh compiled by Pandit Deviprasad.[5] A copy of *Gajâyurveda* is to be found in the Supplementary Catalogue of Sanskrit works in the Saraswati Bhandâram Library of H. H. the Maharaja of Mysore, signed by F. Kielhorn. Aufrecht[6] mentions also such names of treatises on elephants as *Gajadâna*, *Gajadânapaddhati*, *Gajanirâjanavidhi*, *Gajaśânti*, *Gajârohaṇa-Prayoga*, *Gajâvarta-lakṣaṇa*, to be found in the catalogues of Lahore, Benares, Madras, Tanjore and other places.

Treatises named after Pâlakâpya, the first promulgator of the science, the Charaka of Hastyâyurveda, are to be found in the following catalogues:

(1) Report on the Search for Sanskrit manuscripts in the Bombay Presidency during the year 1880-81 by Kielhorn.

(2) Catalogue of MSS. in the Library of the Benares Sanskrit College—published as a Supplement to the "Pandit" Vol. III—IX (Benares, 1864-74).

(3) Catalogue of Sanskrit Mss. in the Library of H. H. the Mahârâja of Bikaneer—compiled by Dr. Râjendralâl Mitra[7] (Calcutta, 1880).

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[1] Aufrecht's analysis of the work in Vol. 27 of the Zeitschrift of the German Oriental Society. Pâlakâpya has been quoted in *Agnipurâṇa* also (Chapter CCLXXVI). See Sivadatta's Preface in Ânandâsrama Edition.

[2] First volume published at Leipzic in 1891, Second volume in 1896. Third volume in 1903.

[3] Aufrecht, I, p. 765.

[4] Published in Calcutta, 1880.

[5] Vol. XVI (1883).

[6] Vol. I, p. 140.

[7] On the merits of Mitra's works Prof. Aufrecht says:

"The copious extracts are very useful, and enable the attentive reader to judge of the contents of a work, even where he is deserted by the English Text. The indefatigable industry of the Editor deserves every kind of commendation."

(4) Catalogue of Sanskrit MSS. in the Private Libraries of the N.-W. Provinces (Allahabad, 1877-86).

(5) A Classified Index to the Sanskrit MSS. in the Palace at Tanjore, by A. C. Burnell (London, 1880).

(6) Detailed Report of operations in search of Sanskrit MSS. in the Bombay Circle (1882-87).

(7) *Suchipustaka* or a list of the MSS. of Fort William, the Asiatic Society in Calcutta, etc. (Calcutta 1838).

The second volume of Aufrecht's monumental *Catalogus Catalogorum* mentions (1) a *Gajaparîkṣâ* in Peterson's Fourth Report on the Search for Sanskrit MSS in the Bombay Circle (1894), (2) a *Gajâyurveda* or *Hastyâyurveda*, (3) a *Gajâyurveda* printed at Poona in 1894 by the Ânandâsrama Publishing House, (4) a *Gajendramokṣaṇa*, said to be taken from the Säntiparva of Mahâbhârata (where, however, it is not found) in the Catalogue of Sanskrit MSS. in the Library of H. H. the Maharaja of Ulwar, and also (5) a *Hastyâyurveda* by Pâlakâpya in the last list.

The third volume of Catalogus Catalogorum published in 1903 adds to the above list the following names :—

(1) *Gajavaidya*, with a commentary in Telugu, in the collection of MSS. belonging to the modern Sanskrit literature presented to the Library of the India Office by A C. Burnell.

(2) *Gajendramokṣaṇa* in Reports on Sanskrit MSS. in Southern India by Hultzsch.

(3) *Hastyâyurveda* by Pâlakâpya in the catalogue of printed books and MSS. in Sanskrit belonging to the Oriental Library of the Asiatic Society of Bengal, compiled by Pandit Kunja Vihari Nyâyabhuṣaṇa, under the supervision of Mahâmahopâdhyâya Haraprasâda Sâstri.

The information contained in these treatises is more or less the same as given in such works of modern times as *Elephants and their Diseases*,[1] by Lieut.-Colonel G. H. Evans, Superintendent, Civil Veterinary Department, Burma, as a cursory glance at the table of contents in the *Hastyâyurveda*[2] published by the Ânandâsrama, Poona, would indicate. This work, attributed to Pâlakâpya Muni, has been edited by Pandit Sivadatta of Jeypore, Professor of Sanskrit in the Government Oriental College, Lahore. In the Sanskrit Preface to his edition Sivadatta says that those branches of Ayurveda concerning elephants, horses and other lower animals which were created by such master-minds as Pâlakâpya, Sâlihotra and others, have become almost extinct and are remembered only by the frequent quotations of latter-day commentators, and that no other Sanskrit treatise on elephants has been printed and published before his.

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[1] Published by the Superintendent, Government Printing, Burma, 1910.

[2] No. 26 of the Ânandâsrama Sanskrit Series, Sivadatta's *Pâlakâpya* (1894, Poona).

The work before us is based on four MSS.: two belonging to Jeypore, one to Poona, and one to Calcutta. It is a huge treatise consisting of 727 pages of royal octavo size. It is divided into four books and contains 12,000 ślokas. Book I is divided into 18 chapters, and is called the *Mahârogasthâna;* Book II is divided into 72 chapters and is called *Kṣudrarogasthâna*; Book III called *Salyasthâna* (surgery) is divided into 34 chapters. The last book has 36 chapters.

The work has been composed in the form of a conversation between King Romapâda of Champâ in the Anga territory and his preceptor, the sage Pâlakâpya. The first four chapters of Book I may be taken to be introductory to the whole work. We are told how the king of the Angas wants to have the elephants of the forests tamed for his state, how the animals are brought from the quarters of the country indicated by Louhitya River (Brahmaputra) and placed under the care of Pâlakâpya, the expert in the theoretical as well practical sciences regarding elephants, who condescends to live with the king and be his 'guide, philosopher, friend' in the training and management of elephants. The fourth chapter gives a preliminary survey of the subject matter treated in the whole book.

Besides all topics connected with anatomy,[1] physiology, surgery, food, medicines, diseases, treatment, poisons, &c., the work deals incidentally with the relations between teachers and pupils in Book I, chapter vi, toxicology in Book II, chapter vi, the seasons in Book IV, chapter xv, the leeches in Book IV, chapter xxxiv, the superstitions and religious observances in Book IV, chapters xxxv and xxxvi. In the 4th chapter of Book I there is a distinction[2] drawn between exclusively theoretical and exclusively practical knowledge in *Hastyâyurveda*, and the advice to rulers is that they should appoint such men only, in charge of the elephants, as combine both theoretical knowledge and practical experience, for each alone is quite useless.

(*B*) *Śâlihotra or the Science of Horses.*

Treatises on horses are known to be *aśwachikitsâ*, *aśwasâstra*, *aśwavaidyaka*, *aswâyurveda*,[3] &c. The father of the science of horses and the first promulgator of the veterinary art concerning them is the sage Śâlihotra, after whom also all these treatises are generally named. It has to be remarked that Sâlihotra stands often for all the veterinary sciences of the Hindus, not necessarily those relating to horse-life. In fact Sâlihotrasâstra is divided into two branches (1) Gajasâstra and (2) Aswasâstra.

We have seen that, besides Pâlakâpya, tradition ascribes treatises on elephants to one Virasena and to Brihaspati. Similarly, besides Sâlihotra, Hindu tradition knows of several authors[4] of works on horses, *e g.*, Nakula,

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[1] Book III, Chapters 9, 29.

[2] V. 106-122.

[3] A fanciful name is *Siddhayoga-saṃgraha*. Cf. Aufrecht I, p. 34.

[4] Aufrecht I, pp. 34-35. See the useful Sanskrit Preface to *Aswavaidyaka* by Pandit Umeschandra Gupta Kaviratna, Librarian, Sanskrit College, Calcutta (1887).

Bhojarâja, Jayadatta, Garga Riṣi, Gaṇa, Jayadeva, Sârangadhara, Nalarâja, Vâhâḍa, Dipamkara and others.

The antiquity of treatises on horses is to be inferred from the following facts. The work of Jayadatta, called *Aswavaidyaka*, has been quoted in *Sârangadharapaddhati*[1]. Sâlihotra has been quoted by Hemâdri in *Vratakhanda*. The *Hayalilâvati*, also a work on horses, has been quoted by Mallinâthâ.[2]

The volume and importance of Hindu literature on horses would be evident from a glance at the references in the three volumes of *Catalogus Catalogorum*. The first volume[3] mentions :—

(1) *Aṣwachikitsâ* or *Aswavaidyaka* by Jayadatta in Oppert's lists.

(2) *Aṣwachikitsâ* or *Aswasâstra* or *Sâlihotrasâstra* by Nakula in notices of Sanskrit MSS. by Râjendralâl Mitra (1871-90), Kielhorn's Catalogue of Sanskrit MSS. in the C. P. (Nagpur, 1874), the Catalogue of Sanskrit MSS. contained in the Private Libraries of Gujrat, Kathiawad, Kach, Sindh and Khandes compiled under the superintendence of Buhler (1871-73, Bombay), Mitra's Bikaner Catalogue, the Catalogue of Pandit Radhakrishna of Lahore, Deviprasada's Oudh Catalogue (vi, xviii, xix), Catalogue of N.-W. P. (V) and Burnell's Tanjore Catalogue.

(3) *Aswadâna* in Oudh and Burnell.

(4) *Aswadânapaddhati* in Radhakrishna and Peterson.

(5) *Aswadânaprayoga* in Burnell.

(6) *Aswadânavidhi* in Oudh.

(7) *Aswalakṣaṇa* in Oppert.

(8) *Aswalîlâvati* or *Hayalilâvati* in Oppert II.

(9) *Aswavaidyaka* by Jayadatta in Mitra's Notices (1871-90), and Oudh (VI, XI, XVIII).

(10) *Aswasâstra* in Burnell.

(11) *Aswasâra* in Buhler.

(12) *Aswâyurveda* or *Siddhayogasamgraha* by Gana, son of Durlabha, in Weber's Berlin Catalogue (1853) and in Peterson; by Garga Riṣi in Kielhorn.

(13) Nakula's *Aswachikitsâ* quoted in *Sârangadharapaddhati*.[4]

(14) *Sâlihotra*, "the general name for veterinary art,[5] ascribed to Sâlihotra Muni, for whom Nakula creates a father, Aswaghoṣa (Turangaghoṣa)," in

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[1] Aufrecht I, p. 199. *Vide* also Pandit Gupta's Sanskrit Preface, p. 6, where he discusses the identity of Jayadeva.

[2] *Vide* Gupta's Sanskrit Preface, p. 2.

[3] Pp. 34-35, 273, 644.

[4] Aufrecht's analysis of the work in Vol. 27 (1873) of the Zeitschrift of the German Oriental Society, p. 43.

[5] Aufrecht, I, p. 644. *Vide* also Pandit Gupta's Sanskrit Preface to *Aswavaidyaka*,

Benares Catalogue, Radhakrishna, Oppert II, Dr. R. G. Bhandarkar's Report on the Search for Sanskrit MSS. in the Bombay Presidency during the year 1883-1884.

(15) *Sâlihotrasâra* in Radhakrishna.
(16) *Sâlihotronnaya* in Burnell.
(17) *Hayalilâvati* (quoted by Mallinâtha) in Bodleian Sanskrit MSS. (Oxford 1136)

The second volume[1] of Aufrecht mentions

(1) *Aswachikitsâ* by Nakula in Stein.
(2) *Aswadâna* in Oudh (XX, XXI).
(3) *Aswaparikṣaṇa*, attributed to Nalarâja in Dr. R. G. Bhandarkar's Lists of Sanskrit MSS. in Private Libraries in the Bombay Presidency.
(4) *Aswavaidyaka* by Jayadatta in Peterson.
(5) *Aswâdiguṇâh* in Peterson.
(6) *Aswâyurveda* by Gaṇa.
(7) *Aswâyurveda-sârasangraha* by Vâhâda, son of Vikrama, in Stein.
(8) *Sâlihotra* "veterinary art," ascribed to Muni Sâlihotra in eight *sthânṣa*. These are called unnaya, uttara, sariraka, chikitsita, kisorachikitsâ or ṣiṣubhaisajya, uttarottara, siddhisthana and rahasya" in Stein.
(9) *Aswavaidyaka* by Jayadatta in Ulwar

Aufrecht's third volume[2] mentions

(1) *Aswachikitsâ* by Nakula in Burnell's collection presented to India Office, in Dr. R. G. Bhandarkar's Report (1887-91); by Sâlihotra in Bhandarkar.

(2) *Aswavaidyaka* by Jayadatta in Hrishi Kesha Sastri and Siva Chandra Gui's Descriptive Catalogue of Sanskrit MSS. in the Library of Sanskrit College, Calcutta (1898); by Dipamkara, son of Nanakara, grandson of Nidanakara, in Haraparasâda Sâstri's Report (1895-1900).

(3) *Aswâyurveda* by Gaṇa in Haraprasâda Sâstri.

The Hindu treatises on horses treat of almost the same topics as are dealt with in modern works on the subject, *e.g.*, Lieut.-General Sir F. Fitzwygram's *Horses and Stables*,[3] Hayes' *Training and Horse Management in India*,[4] *etc.* The 68 chapters in the *Aswavaidyaka* of Jayadatta and 18 chapters in *Aswachikitsâ* of Nakula, both edited by Pandit Umeschandra Gupta, Librarian, Sanskrit College, Calcutta, for the *Bibliotheca Indica* (1887) deal among other things with their anatomy, the good and bad signs, as indicated by their colour, feathers, &c., age, growth and development, the classification according to mettle, their movements, paces &c., and usefulness as draught-animals or as cavalry &c., embryology, articles of food and nourishment according to seasons, the various ailments and remedies, &c.

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[1] Pp. 7, 153, 188.

[2] P. 8.

[3] Longmans, Green & Co., London, 1911.

[4] Longmans, Green & Co., London, 1905.

The origin of the science of horses is thus described by the editor in the Sanskrit Preface on the evidence of Nakula's treatise. The winged horses of Indra could not be controlled. So Sâlihotra was requested by Indra to lop off their wings. This was done, but the poor animals waited in deputation upon the powerful sage who had brought them to this plight. He was moved and the result was the composition of treatises to heal the wounds of the horses and minister to the needs of their proper development.

APPENDIX B.

(*j*). *Zoological Taxonomy of the Hindus.*

See Dr. Seal's notes on the subject in Appendices.

SECTION 4.

The Sukra Fauna.

The authors of the Sukra Cycle were well-read men, their culture was widely varied, and their scholarship adequately deep. The Mineralogical and Botanical data in their work call up before us the large range of their studies, as they unmistakably point to their thorough grasp of the scientific literature of their times. Further, the brief and fragmentary survey of the Zoological lore of the Hindus we have given in the preceding section (i) indicates not only the character of the literary atmosphere in which all Sanskrit works were composed in ancient and mediæval India, but (ii) also suggests to a certain extent the curriculum of nature-studies or the courses of scientific instruction which undoubtedly formed an integral part of the liberal education of the *Brahmachâris* of yore.

The words of Mark Pattison that the appreciation of Milton's poetry is the last test of consummate classical scholarship, apply with equal force to the *Nitisâstra* of Sukrâchâryya, since in this work the authors have summed up the whole encyclopædia of Hindu learning, literary, scientific as well as technical, according to the conception and standard of those ages. *Sukraniti*, from its scope and subject matter, is, as we have already noticed in the chapter on Mineralogy, the embodiment of comprehensive Hindu scholarship, its achievements and limitations, its processes and products, its methodology and contributions—not, however, in the interest of an abstract, academic, intellectual gymnastics, but solely to subserve the practical ends of Hindu socio-economic and socio-political life, in accordance with the actual requirements of some of the epochs of Indian culture-history.

This, however, is unfortunately the main reason why it is difficult to realise the local or epochal characteristics of the work. The analysis of the internal evidences does not carry us very far. The fallacy of *argumentum ex silentio* and the existence of floating or conventional ideas are the eternal agencies that circumscribe the range of 'wide solutions' that may be possibly attempted. Besides, it is not always easy to estimate the value of the findings or data from a work; for (1) they are not sufficiently copious, (2) their comparison and contrast *with standard texts are not in many cases possible, because of the want of many* such texts of approved authenticity, and (3) their comparison and contrast with the physical and sociological conditions are, if anything, really vague, indefinite and inconclusive, because of the epitomic and almost universal or uniform character of the Indian world, in both its physical and human aspects.

Thus with regard to the Sukra Fauna, it is not possible to achieve even the tentative character of the results we have arrived at in our treatment of the Botanical data. For our authors have drawn upon the animal world of their country and the Zoological lore of their people in a very general manner. It is not safe to assign a specific character to their references to animal-life, as we have been able to do in the case of their botanical knowledge.

The animal world has been portrayed by the Sukra authors mainly as a store-house of analogies, illustrations, &c. for the truths of the moral world. This treatment is more or less conventional, and, while it indicates a familiarity of the authors with the habits, habitats, &c., of animals, it does not supply us with a positive *terra firma* or a reasonable ground for presuming any geographical limits, and does not seem to prove anything beyond a mere acquaintance with the lore on the subject, through fables or adages.

Besides these illustrative references, there are in Sukranîti some toxicological ideas dealing with the sensitiveness of certain animals to poisons. Now Toxicology is a science as old as the Ayurveda. We meet with it in all medical treatises from Charaka downwards. Pâlakâpya also deals with the subject. The *Arthasâstra* of Kautilya, the work of the 4th century B.C., utilises the current ideas in its chapter on the management of the royal household.

Thirdly, the agricultural live-stock and domestic cattle have been referred to in Sukranîti, but the references are not very exhaustive. Anything like detailed treatment of the animal world is to be met with in the chapter on the Animal-corps of the state. But here, also, we miss, as we should, not only the comprehensive character of *Pâlakâpya* and *Aswavaidyaka*, &c,--treatises devoted exclusively to elephants and horses,--but also the elaborate details that we expect in handbooks meant for officers of the state. Such an exhaustive account of the military live-stock, however, we get from Kautilya's *Arthasâstra*, which has drawn upon the veterinary literature of the country to a more considerable extent.

Thus the whole subject of cattle, their maintenance, protection, medical treatment &c., treated in the second chapter of Mr. Law's work based on the *Arthasâstra*, is entirely lacking in *Sukranîti*. Similarly, the geographical, technical and other aspects of fauna, wild, domestic, agricultural or military, which are to be met with in Sivadatta's edition of *Hastyâyurveda* and Umeshchandra's edition of treatises on horses by Jayadatta and Nakula, have been treated by Kautilya, but neglected by the Sukra authors. To quote Mr. Law,[1] "As in regard to horses, certain ceremonies were observed to propitiate unseen agencies for the welfare of elephants. Thus *ârati*, or waving of lights, was performed thrice daily in the rainy season and at periods of conjunction of two seasons. Sacrifices to *Bhûtas* were also performed on new moon and full-moon days, as also to Senâni or Kârtikeya, the god of war." Ceremonies like these have been described in the last two chapters of Pâlakâpya, Book IV.

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[1] P. 58.

A reference to the Zoological works in Hindu literature would demonstrate the depth and width of the learning displayed by Kautilya in his compilation of the *Imperial Gazetteer* of Maurya India, and would substantiate the truth contained in the following words with which Mr. Law concludes his account of the Department of Live-stock in Chandragupta's Government: 'We have seen the comprehensive character of its scope and work touching the welfare and growth of such important animals as the cow, the horse or the elephant, on which depended, to a great extent, both the economic prosperity and political security of the country."

The paucity of Zoological information supplied by *Sukraniti* would be evident from another consideration also. In the case of the Flora, the enumeration of trees in two lists gave us scope wide enough for the application of the ecological and literary methods in order to find out its *locale*. But the authors have not presented us with any taxonomy of animals, scientific or unscientific, or any register of the fauna to be kept in Zoological gardens or hunting forests, or the like. We do not read in the Sukraniti of any system of classification or enumeration like that we find in the *Artha-sâstra*, for example. The following list of Kautilya, though very poor, does at any rate furnish us with a positive record of the fauna in the Royal Gardens or State Forests of the Empire ruled from Pâtaliputra, the historic city of Eastern India in the post-Buddhistic ages. The animals[1] that were exempted from capture, molestation and slaughter, and maintained in the *Abhaya-vanas*, or 'Forests of safety,' are :—

(1) Birds, deer and other animals living in the forests under state protection, as well as fishes in the ponds therein.

(2) Those birds, fishes, deer, and other animals that do not prey upon life.

(3) Calves, bulls, and milch-cows.

(4) Ocean animals resembling elephant, horse, man, ox, or ass.

(5) Fishes in rivers, lakes and canals.

(6) A few game-birds, specially named as follows: cranes in rivers, lakes and canals, ospreys, sea-eagles, gallinules, swans, flamingoes, &c., Brahmany ducks, pheasants, fork-tailed shrikes, partridges, cuckoos, peacocks, parrots, *Turdus salica* (mainâ).

(7) Those birds and beasts that were regarded as sacred (*e.g.*, those enumerated in Asoka's Rock-Edict V).

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[1] Law's *Studies*, pp. 32-33. The protection of birds in agricultural countries is a necessity as worm-eaters. *Cf.* the wretched condition of French agriculture as a result of the indiscriminate destruction of birds.

Even such a list, if we had it in Sukranîti, would not have been sufficient *for the purposes of finding out the locale* of the Fauna and of the authors *who described it ; for (i) a study of the* Zoological geography[1] of India would indicate that these are more or less uniformly distributed throughout the country, and (ii) the commercial history would show that fauna have been imported to long distances from their native habitats as articles of commerce.

But Sukranîti refers to animals only incidentally as it were; the natural presumption being that the nature-studies in it, as far as the fauna is concerned, are not probably the result of any direct local or personal experience, but are derived from the perusal of works on the subject or the store-house of floating Zoological literature. If, again, personal or local experience be admitted, no conclusive evidence as to the home of the authors can be secured, since the animals may be brought from place to place for purposes of sale.

The existence of camel-corps in the army seems to be a special feature of Sukranîti and might point to the locality where camels abound.[2]

But camels have been important in Indian economic life since at least the days of *Arthasâstra.* Thus, among the duties of the superintendent of pastures[3] in Chandragupta's Empire, was the regulation of the grazing of cattle. "As to the kind of animals that were allowed admission into the grazing grounds, we have information from two passages. The first passage mentions that a herd may be of cows, buffaloes, goats, sheep, asses, camels, horses or mules. The second passage, which appears in a different context, refers to cows, horses, and camels as being the animals which flourish on pastures and are the source of power to the king."

If camels be recognised to be a 'source of power to the king' by the Prime Minister of the first Empire-builder in India, it is not difficult to see that the camel-corps should have been a regular institution in the war-establishment of Hindu kings of any importance. Even if their territory did not include areas specially fit for camel-life, rulers would find no difficulty in importing them as articles of commerce for purposes of conveyance, peaceful or military. It may be observed that, as marketable commodities, animals, though less mobile than metals and precious stones, are more so than flora ; the 'market' for them is therefore wider and more extensive.

As for the habitat of camels, it has to be noted, that they are "nowhere found in a wild state."[4] Again, to quote from Blanford's *Mammalia* in the *Fauna of British India,* "It is unknown in the wild state, and although Bactrian camels have been found wild by Prejvalski and others in the deserts east of Yarkand, there is but little doubt that these wild individuals are descended from tame ancestors."

The result is, that camels are to be seen wherever there are people rich enough to need and have a 'demand' for them. The mention of camels and existence of camel-corps, therefore, do not necessarily point to the natural habitat of these animals, but solely to the power, prosperity and importance of the persons who command them.

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[1] Chapter V. *Indian Empire* Vol I, in the *Imperial Gazetteer* of India.

[2] As Prof. Yogeshchandra Ray suggests in a footnote to *Ratnaparikṣâ.*

[3] Law's *Studies*, p. 27.

[4] *Natural History of Indian Mammalia* by Storndale (Thacker, Spink & Co., Calcutta, 1884), p. 518.

Just as in the case of minerals we could not come to any reasonable conclusion as to the locale of the Sukra authors, so also here we have to confess inability to point to any geographical environment which might leave its stamp on the work. We proceed now to give an account of the various species of fauna referred to in Sukraniti.[1]

SECTION 5.

Mammals in Sukranîti.

Reserving for subsequent treatment the agricultural live-stock and animal-corps, we notice here the various orders of fauna treated by the Sukra authors.

(*a*) *Primates.*

The monkey[2] is one of the animals whose sensitiveness to poison should be availed of in the detection of deleterious and malefic ingredients in the king's food. The test is supplied by the fact that at the very sight of poisoned food, monkeys pass stools.

The Sukra authors have recorded also the tradition of monkeys being followers of the hero of the Râmâyaṇa. "There has never been a virtuous king like Râma, of whom even monkeys[3] accepted service." Again, "Fate was certainly unfavourable to Râvâṇa, when he met with discomfiture from even one monkey[4] on the occasion of *Vanabhanga.*"

(*b*) *Carnivora.*

There are three families of this order in Sukraniti—Cats, Dogs and Bears.

i. Felidæ,

The Felidæ or Family of Cats is represented by (1) the Lion, (2) the Tiger, (3) the Fishing cat.

In *Sukranîti,* the lion is the embodiment of strength[5] and prowess. The authors have illustrated the strength of unity by drawing the analogy of the union of threads. "The unity of opinion possessed by the Many is more powerful than the king. The rope that is made by a combination of many threads is strong enough to drag the lion."

The lion is the king of animals, and hence is used by all Sanskrit authors for comparison with the ruler of men. Lion-cubs are like princes;[6] in the section dealing with the management of princes we are told that "even when well-governed, if they get a slight opening, they forthwith kill the protector, as lion-cubs kill the elephant at the first opportunity."

Lions were tamed[7] in those days. The taming of lions has supplied an

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[1] 1889-91, p. 558.

[2] Sukra IV, vii, 838-39.

[3] Sukra II, 35-37.

[4] Sukra I, 653-57.

[5] Sukra V, 114-15.

[6] Sukra I, 111-13.

[7] Sukra IV, i, 48-49.

illustration in statecraft. "One should bring friends and foes to bay by appropriate methods, just as snakes, elephants and lions are tamed."

The tiger[1] is one of the animals with which the king is advised to sport in the forests, and which is to be used by him for extirpating the undesirable, *i.e.*, seditious or intriguing,[2] relatives in the interest of the state's prosperity.

Tiger-hunting was certainly one of the adventurous feats of both rulers and men ; among the general rules of morality we have the advice that one should not go alone to attack snakes, tigers[3] and thieves.

The tiger is known to be inferior in position to the lion. It is also stated that the king should promote the soldiers' strength and valour by organising hunting excursions against tigers[4] and big game.

Thus we read that, just as even the tiger[5] and the elephant cannot govern the lion, the king of beasts, so all the councillors combined are unable to control the king, who acts at his own sweet will.

The tiger is also known to be untamable, hence the advice, "Association with tiger,[6] fire, snake, and other ferocious animals is not good. Even when served, the king and these things can never be friends to any body."

It has to be remarked that Sukra authors know of the lion and the tiger as animals belonging to the same tribe, the Felidæ. In the section on construction of images of gods and their *vâhanas* (vehicles or conveyances or symbols), we have the following rules : "The tiger[7] has the form of a cat, yellow colour, black marks (stripes), huge physique and no manes. The lion has a thin waist, large eye-brows, big eyes, a young appearance, manes, grey colour and black marks. The difference between the lion and the tiger is only in manes and marks, not in appearance." The fact that these animals belong to the same family is known by the proverb common enough in India that the cats are aunts of these animals.

The tiger is one of the animals that have supplied emblems and seals of state. Thus, on the authority of the Tamil classic, *Pattinappâli*, Mr. Aiyangar says in *Ancient India*[8]: "They did not forget in those days to maintain a regular customs establishment, the officials of which piled up the grain and stored up the things that could not immediately be measured and appraised, leaving them in the dockyards carefully sealed with the tiger signet of the king."

The cat[9] is the animal the lustre of whose eyes has supplied the name for the moving rays of a gem, called Vaiduryya. The habits of the fishing cat are well-known to the Sukra authors. In the supplementary chapter dealing with the political morality of rulers, Sukrâchâryya advises the king always to be on the look out for opportunities. "One should wait guardedly like the cat[10] and the fowler, and by creating confidence extirpate the enemy whose soul has been ruined by vices."

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[1] Sukra I, 665-66.

[2] Sukra II, 55-56.

[3] Sukra III, 323.

[4] Sukra IV, vii, 830-31.

[5] Sukra IV, iv, 331-35.

[6] Sukra IV, vii, 34-35.

[7] Sukra III, 518-519.

[8] P. 66.

[9] Sukra IV, ii, 92.

[10] Sukra V, 8-9.

ii. Canidæ.

The Canidæ or the Dog-Family is poorly represented. There are no references to jackals, foxes or wolves. Only the common dog has been mentioned. It stands for a contemptible miserable creature in the following Burns-like ultra-socialistic statement of Sukrâchâryya : "Does not even the dog [1] look like a king when it has ascended a royal conveyance ? Is not the king justly looked upon as a dog by the poets ?"

The idea is that the king does not look magnificent unless he is attended by the retinue of officers and the regal insignia as well as the paraphernalia. The king alone is no more than a dog, *i.e.*, cannot command awe and reverence of the people. Truly,

"The rank is but the guinea's stamp,
The man is the gowd for a'that.

* * * *

You see you birkie, ca'd a lord,
Wha struts, and stares, and a' that ;
Though hundreds worship at his word,
He's but a coof for a'that."

iii. Ursidæ.

The Ursidæ or Bear-Family is likewise not important in Sukraniti. One species has been mentioned and that only once. The timid horses are known to be those that have snake-like tongues and the colour of bears.[2] Evidently the black bears[3] are referred to, which are covered with long coarse hair, inhabit some of the hottest parts of India, are generally very timid and are easily tamed.

(*c*) *Rodentia.*

Only one Family of this order has been mentioned in Sukraniti, *e.g.*, Rats and Mice.

The Muridæ or Rat-Family is represented by common rats. Their sensitiveness to poison has been mentioned by the authors as one of the tests for examining the food of the king. At the very sight of poisoned food the rats[4] become excited."

(*d*) *Ungulata.*

"To this order belong elephants, horses, rhinoceros, tapirs, oxen, antelopes, goats, sheep, deer, camels, and swine, besides several generic forms not now found in India. Some of these, however,—for instance, aspecies of giraffe and hippopotamus inhabited the country in past times. All the most valuable domestic animals are ungulates."

From this statement of Blanford it might be naturally expected that the ungulates should be copiously represented in Sukraniti. In fact it is so ; and

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[1] Sukra I, 745-16.

[2] Sukra IV, vii, 330.

[3] Indian Empire, Vol. I, Chap. 5, p. 223, in the Imp. Gazet. Series.

[4] Sukra I, 654-57.

whenever there is a general reference to animals or an enumeration of several species, we may take it to imply the ungulates. Reserving the agricultural and military *live-stock, e.g., the elephants, horses,* camels and bulls for separate treatment, we mention below the various contexts in which the other families of the ungulates have been referred to by the Sukra authors.

i. Capridæ.

The Capridæ or Goat-Family has been well-represented in Sukranîti. Of course the distinction between goats and antelopes cannot be traced in it Among the references to cattle, without any specification, goats are to be understood as belonging to them. And in those passages where one or two animals have been mentioned by name and the others are referred to by an " etc.," goats should certainly be counted.

Some of the officers in the Department of Live-stock in Hindu States are in charge of goats,[1] sheep, cows &c. Only such persons are to be appointed as are skilful in tending and nourishing them and who have love for those animals.

The goat is known to be a very stupid animal. The stupidity of a man, vain through possession of wealth, is thus described : "The man who is proud of his wealth does not know of his own infamy, just as the goat[2] uses his urine to wash his own urine-scented mouth or face."

The comparative prices[3] of sheep, goats and cows are given below :

Ordinary :

She-goat = $\frac{1}{2}$ cow [= $\frac{1}{2}$ silver *pala* (= Rs. 4)].

She-sheep = $\frac{1}{2}$ she-goat = $\frac{1}{4}$ cow [= Rs. 2]

Extraordinary :

Cow = 8 or 10 silver *palas* = Rs. 64 or 80.

She-goat or she-sheep = 1 silver *pala* = Rs. 8.

The Public Finance of Sukrâchâryya recognises goats and other animals as important national resources to be tapped in the interest of the state. The king should realise one-eighth of the increase of goats,[4] and one-sixteenth of the milk of she-goats. The payments are to be in kind, it appears.

ii. Ovidæ.

The Ovidæ or Sheep-Family has received the same treatment in Sukranîti as the Capridæ. We have seen in connexion with goats the rules about the appointment of officers for the management of the royal live-stock. The prices of sheep also have been given above in the comparative statement. The wool[5] derived from the fleece of the sheep is, like silk, an important article of the royal household ; and trained men have to be appointed to look after these stuffs.

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[1] Sukra II, 297-8.

[2] Sukra III, 179-180.

[3] Sukra IV, ii, 188-192. The History of Indian Prices will be dealt with in the chapter on the *Data of Ancient Indian Economics.*

[4] **Sukra IV, ii, 239-240.**

[5] **SukraII, 307-308.**

The state revenue from sheep is indicated in the following regulation : *The king should have one-eighth of the increase of sheep,*[1] *and one-sixteenth of the milk of the female animals.* The rule is thus exactly the same as in the case of goats.

iii. Cervidæ.

The Cervidæ or Deer-Family is celebrated in Indian classical poetry. The elongated eyes of the animal are the touchstone of beauty in visual organs, according to the æsthetic sense of damsels idealisd by Hindu poets. The animal is also appreciated for its gentle and tame disposition, and is the invariable stock-in-trade of authors for describing peaceful hermitages of ascetics and saints. The deer is known to be very fond of music. In Rajput school of painting, the deer is the conventional symbol[2] for one of the tunes or Râgiṇîs, called the *Tori.* Sukrâchâryya, in describing the *Viṣayas* or things of enjoyment which overpower the character of human beings, refers to the effects of delightful sound even upon lower creatures : " The deer,[3] which is innocent, feeds upon grass and blades and can roam far and wide, seeks death attracted by the music of the tempter." This fondness of the deer for music has been again referred to in connexion with statecraft. "One should always do good of those whom one intends to ruin. The fowler sings sweet in order to entice and kill the deer."[4]

The Department of Live-stock should make provision for stabling the animals. The following rule about deer applies equally to goats, sheep, &c. : " Houses should be built towards the west for cows, deer,[5] camels, elephants and other animals." The rule for the appointment of men in charge of animals is the same in all cases. We are told that each species should have a separate staff of officers : "The king should appoint separately the heads of elephants, horses, chariots, infantry, cattle, camels, deer,[6] birds, gold, jewels," &c. The qualifications of such men have been already noted in connexion with goats and sheep. The leaping of the deer is well-known and supplies the technical term for a pace of horses : "The pluta movement is that in which the horse leaps with all the four legs like the deer."[7]

The prices of deer have not been noticed, nor also the revenue derived from them.

iv. Suidæ.

The Suidæ or Boar-Family has supplied an avatâra or incarnation of Viṣṇu, as we have previously noticed, in Hindu mythology. In the *Sukranîti* we do not read much of it. The tradition is recorded that one of the sources of pearls is the hog.[8]

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[1] Sukra IV,ii ,239-40.

[2] See Coomâraswâmy's *Selected Examples of Indian Art.*

[3] Sukra I, 203-4. See also III, 33-34.

[4] Sukra V, 62-63.

[5] Sukra I, 450.

[6] Sukra II, 237-238.

[7] Sukra IV, vii, 294.

[8] Sukra IV, ii, 117-18.

(*e*) *Cetacea.*

The whale is known to be an aquatic animal. It is symbolical of huge size. Sukrâchâryya teaches man humility by the following illustration: "One should remember that there is the animal which devours the devourer of whales,[1] Râghava is the devourer of that even, and there is the destroyer of Râghava." So the rule[2] is that the wise man should never consider "I am superior to all, I am more learned than others."

SECTION 6.

Aves in Sukranîti.

Birds[3] are mentioned along with the cattle and other animals as some of the attractions of the place where the capital city is to be built. The economic importance of this department of Fauna is further shown in *Sukranîti* by the provision for the appointment of a special staff to look after the birds[4] maintained by the state. Some of the battle-orders in which troops are enjoined to be arrayed indicate careful observations of the limbs of the aves and their habits, &c.

(*a*) *Passeres.*

Passeres[5] constitute more than half of the Birds of India; but only one family of this order has been mentioned in Sukranîti, *e.g.*, the Eulabetidæ. The bird gackle, talking mainâ or hill mainâ which belongs to this family is to be used in the examination of royal food. The toxicological principle is the fact that the bird begins vomiting at the very sight of poisoned food.[6]

(*b*) *Coccyges.*

The cuckoos belong to the Cuculidæ Family of this order. The shout of the bird is traditionally known to be sweet and has been much poetised both in the east and west. In advising people to learn restraint and gentleness in speech, Sukrâchâryya remarks that "the voices of the drake red with passion, the cuckoo[7] and the peacock are not so attractive as those of the good and the wise." It requires to be noted here that poets have not bestowed much attention on the talking mainâ which has the wonderful power of imitating human voice.

(*c*) *Psittaci.*

To this order belong the parrots, which can be made to acquire human voice like hill mainâs. Among the qualifications of persons to be appointed to the Department of Live-stock, one is the ability to teach parrots,[8] (and birds generally). Sukrâchâryya refers again to the educability of these birds in the following lines :

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[1] Sukra III, 446-47.
[2] Sukra III, 444-45.
[3] Sukra I, 425-28.
[4] Sukra II, 237-38.
[5] Indian Empire, Vol. I, p. 239, in *Imperial Gazetteer.*
[6] Sukra I, 654-57.
[7] Sukra I, 337-38.
[8] Sukra II, 300-02.

"The elephant, the horse, the ox, the child, the wife and the parrot[1] get the qualities of their teachers through association."

(*d*) *Accipitres.*

To this order belong the Indian birds of prey. The Syena or hawk is the only bird mentioned in Sukranîti that may be placed in one of the families of this very great order. One of the qualifications of men to be appointed in charge of birds and animals is the knowledge and skill of catching hawks[2] by appropriate enticements. They must know when such birds fall victims to arrows. This bird has supplied a technical term to military science. One of the forms of battle array is known to be the syena or hawk-order or order with two wings. The soldiers are to be arrayed in this form when the enemy is known to have placed danger ahead,[3] *i.e.*, when the army has to encounter a front attack. It is the order in which the wings[4] are large, the throat and tail medium, and the mouth small.

(*e*) *Columbæ.*

Pigeons or Treroninæ are common Indian birds belonging to the Columbæ order. This bird also has supplied the form of a battle order called after it the ***Krauncha Vyuha***[5] or Pigeon array. It is to be formed according to the nature of the region and the troops in the same rows as the movements of pigeons in the sky. It is that order in which the neck is thin, the tail medium and the wings thick.

(*f*) *Gallinæ.*

This order comprises the common Game Birds of India, *e.g.*, pea-fowls, jungle-fowls, pheasants, partridges, quails, &c. This order is well-represented in Sukranîti.

The peacock's divided note is called ***keka*** in Indian literature, and the bird itself is held sacred *e.g.* by several ruling dynasties. It is the ***vâhana*** of the war-god ***Kârtikeya.*** Sukra authors, as we have seen above,have recorded the tradition about its voice. "The man who is popular speaks sweet words like the notes of the peacock."[6] "But the voice of the peacock is not so sweet as that of the good and the wise. So one should use pleasant words both to good men and enemies. The sensitiveness of peacocks to poisons is a test to be utilised in the examination of royal food ; for at the sight of poisons, toxicologists say, peacocks begin to dance."[7] The feathers[8] of the bird are known to the Sukra authors as possessing bright lustre ofemerald or pâchî. Its long neck has also been observed. The gait of the horse is called ***valgita***

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[1] Sukra III, 582-583.

[2] Sukra II, 300-302.

[3] Sukra IV, vii, 527-28.

[4] Sukra IV, vii, 550.

[5] Sukra IV, vii, 556-58.

[6] Sukra I, 385-88.

[7] Sukra I, 654-57.

[8] Sukra IV, ii, 87.

when it runs with contracted legs, neck raised like that of the peacock[1] *and half the body trembling.*

The jungle-fowl or the cock[2] *is known to cry at the very sight of poison. This supplies a test to the medical officers superintending the royal kitchen.*

The tittira or partridge has been referred to only once. It is stated that the men in charge of birds should be competent enough, among other things, to domesticate the partridges.[3]

(*g*) *Grallæ.*

The Gruidæ or Crane-Family is one of the many families belonging to this order that has been mentioned in Sukraniti. Cranes get intoxicated[4] at the sight of poisons. Hence, their utility to men and especially to princes who should always have their food examined before meals.

(*h*) *Anserees.*

Ducks belong to this order. These birds begin to limp[5] at the very sight of poisons. This sensitiveness is to be utilised by the medical men of the palace. Drakes or Swans or Ganders are also famous in Indian poetry as emblematic of passionate love. Their notes are known to be sweet like those of the cuckoo and the peacock. Thus we have the advice regarding cultivation of restraint and gentleness in speech : " The voices of the drake[6] red with passion, the cuckoo, and peacock are not so attractive as those of the good and the wise."

SECTION 7.

Reptiles in Sukraniti.

According to the *Fauna of British India* (1890-1900) there are altogether 153 genera containing 558 species of reptiles in India. These belong to three orders: (1) *Emydosauria* or Crocodiles ; (2) *Chelonia* or Tortoises and Turtles and (3) *Squamata* or Lizards and Snakes.

" The Reptiles of India[7] are far more numerous than mammals and more destructive to human life ; snake-bites alone cause more deaths than all the wild beasts together."

It is not strange, therefore, that Reptiles should have made a deep impression on the life, habits and thought or literature and art of the people of India in ancient and mediæval times. Sukraniti is full of references to reptiles, especially to snakes, indicating the great familiarity of the authors and their countrymen with these species of Fauna, whether they willed it or no.

(*a*) *Emydosauria.*

The *makara* or alligator is a very familiar river animal. It has left its influence on Hindu religion, art and industry. It is sacred to the goddess Gangâ, one of the national rivers of the Hindus. The goldsmiths and jewellers manufacture the alligator pattern of ornaments and decorative devices much appreciated by connoisseurs. The national taste of the people also finds satisfaction in the alligator shapes perpetuated in sculpture and painting.

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[1] Sukra IV, vii, 297-98.

[2] Sukra I, 654-57.

[3] Sukra II, 297-298.

[4] Sukra I, 654-57.

[5] *Ibid.*

[6] Sukra I, 337-338.

[7] *Imperial Gazetteer of India* – Indian Empire, Vol. I, Chap. V, Zoology.

Nor is this all. This family of reptiles has contributed a technique to military science or *Dhanurveda*. Thus, according to *Sukranîti*, one of the recognised Battle-orders is the alligator array[1] in which the commander should arrange his troops when he has to face an opposition in the front. This *vyuha* or array[2] is described as that form which has four legs, long and thick mouth and two lips. There is no doubt that the formation is based on a correct observation of the external organs of the animal.

(*b*) *Chelonia.*

Tortoises are sacred to the goddess Yamunâ, another holy river of the Hindus in upper India. Like the Boar, this species of Fauna has contributed an avatâra, or one of the 10 divine incarnations, to Hindu mythology. The animal has been referred to only once in a passage that describes at once its physique as well as an important feature of the material civilisation of ancient India. The Sukra ideal of road-making is given in the following line: "The roads are to be made like the back of a tortoise[3] (*i.e.*, high in the middle), and should be provided with drains on both sides for the passage of water."

Tortoise[4] shells seem to have been some of the articles of trade in the early Christian era. The *Periplus* records that from the port of Muziris on the Arabian coast, famous also in Tamil classics, the list of exports included among other things "tortoise shell from the golden Chersonese or from the islands off the coast of Limurike."

(*c*) *Squamata.*

The dangerous character of snakes is too well-known. But bad men are more dangerous than they. The advice, therefore, is that "one should associate rather with snakes[5] whose mouths contain poison and whose faces have been darkened by the smoke of fire exhaled by their breathings, but never with bad men."

Like the tiger, the snake is also emblemical of fury and vehemence. One of the attributes of the king is fury and prowess. He is therefore naturally compared with a snake,[6] and officers are advised to approach him with caution.

The snake is never to be pitied or neglected. "The snake,[7] the fire, the wicked man, the king, the son-in-law, the nephew, the disease, and the enemy —these are not to be regarded as being too small." Expeditions against snakes[8] must, therefore, have been common. The advice is "one should not go alone to attack snakes, tigers and thieves"

Another reference to dangerous things includes snakes also. "Association with tiger, fire, snake[1] and other ferocious animals is not good. Even when served, the king and these things can never be friends to anybody."

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[1] Sukra IV, vii, 527, 528.

[2] Sukra IV, vii, 560.

[3] Sukra I, 531-32.

[4] Aiyangar—Ancient India, p. 65.

[5] Sukra I, 327-28.

[6] Sukra 430-31

[7] Sukra III, 212-13.

[8] Sukra III, 323.

Snake-charming[2] was practised, as even now. The power of the snake-charmer over the snake supplies a very characteristic analogy : " The minister masters the king by the force of mantra (charm or counsels), just as the snake-charmer subdues the snake."

Of the above extracts, four come from a single chapter, that on the general rules of morality. As all the references are but casual, they indicate the enormous impression made by venomous snakes on the general thought of the people.

The same topic about the natural or ingrained maleficence of snakes is harped on in the following verses: " Instructions to foolish people are the causes of their anger, not pleasure; just as the drinking of water by snakes[3] is for the making of poison, not of nectar."

Sukra authors have recorded the tradition of gems being borne on the heads of snakes. " The gem on the head of the snake[4] is the best of all, of very great splendour, but very rare. Snakes[5] are also said to constitute one of the sources of pearls. The real explanation of the popular idea has been given in the chapter on mineralogy. The snakes have to pick up bright stones in their mouths when they move about in the dark. These stones are their lamps, so to speak, and serve the purpose of pointing out their paths.

The snake has contributed one battle-formation named after itself. The vyâla or snake array[6] should be devised by the commander when the danger is on all sides. It looks like the snake.[7]

Further references to snakes are given below :--

(1) As an ordeal or *divya* : The accused has to swallow poison or catch the poisonous snake[8] by the hand ; and if he gets scot free, his innocence is proved ; otherwise not.

(2) The earth swallows the king who does not fight, and the Brahman who does not go abroad, just as the snake[9] swallows the animals living in the holes.

(3) One should keep five cubits from the carriage, ten cubits from the horse, one hundred cubits from the snake,[10] and ten cubits from the bull.

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[1] Sukra III, 518-19.
[2] Sukra III, 561-62.
[3] Sukra IV, i, 37-38.
[4] Sukra IV, ii, 96.
[5] Sukra IV, ii, 117-118.
[6] Sukra IV, vii. 520-31.
[7] Sukra IV, vii, 565.
[8] Sukra IV, v, 478.
[9] Sukra IV, vii, 604-5.
[10] Sukra III, 281-2.

SECTION 8.

Pisces in Sukraniti.

Fishes and Fish life are well-known to Sukra authors. Fishing and angling must have been familiar practices. Thus one of the illustrations in Sukranîti about the bad effects of the inclination to satisfy the sense of taste, one of the classical *vyasanas* or vices, is drawn from angling: "The fish,[1] though it dives into unfathomed depths and lives in distant abodes, tastes the angle with meat for death" The fish is thus the object lesson for the danger from *rasa* or taste. This fact has been recorded again: "The deer, the elephant, the fly, the bee, and the fish[2]—these five are ruined through sound, touch, form, smell and taste respectively."

Fish-eating[3] is also known; but it is described as a local custom confined to *madhyadesa*. The limits of the country indicated by it have been discussed in the chapter on Geography. It has been suggested that the ideal advocated or 'norm' represented by the Sukra authors is one of vegetarianism, fish-eating being something abnormal. It has to be noted that in Sukranîti there is no mention of fishermen as a class,[4] fishing as a kalâ, or realisation of revenue from that industry. It may be surmised that it is not one of the state-recognised occupations of the country according to Sukranîti, the people among whom or for whom it was compiled being generally abstemious in the matter of fish and meat diet.

Fishes are known to be sources of pearls.[5]

Like the tiger, the fish also supplied an emblem of kings. In the Tamil classic, Epic of the Anklet, (2nd cent. A.D.) "there are a number of references throughout the work to the erecting of the fish-emblem[6] on the Himalayas. * * * These achievements are clearly ascribed to the reigning Pandyan in Canto xvii."

SECTION 9.

Invertebrates in Sukranîti.

Sukranîti is not so rich in observations regarding habits, habitats and organs, &c., of invertebrates as of vertebrates, especially Aves and Reptiles.

Conches belonging to the *Mollusca* class of Invertebrates are very important in Hindu religious ceremonies. The notes produced by blowing the shells of these molluscs with the mouth are integral features associated with auspicious and purificatory occasions. In Sukranîti these are mentioned together with drums, trumpets, pipes &c., as ware-paraphernalia to indicate by their sounds, like bugles, the construction of battle-arrays.[7] They are also known to be the sources of pearls,[8] like snakes, fishes, &c. Their colour is characteristic. The teeth of horses[1] acquire this colour from the twenty-first year.

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[1] Sukra I, 209-210.

[2] Sukra III, 33-34.

[3] Sukra IV, v, 95-96.

[4] Sukra II, 390-411.

[5] Sukra IV, ii, 117-118.

[6] Aiyangar's *Ancient India*. p. 356.

[7] Sukra II, 402-3.

[8] Sukra IV, ii, 117-118.

Varâtis or cowries are also smaller species of the same order important in Indian economic life as a form of what is technically called "money." These are the lowest coins for the standard of value and medium of exchange. They are mentioned in Sukranîti only in connection with currency,[2] as indicating its unit.

A third species, belonging to the Mollusca, mentioned in Sukranîti, is known to be the most prolific source of pearls. It is the oyster-shells.[3] It is the pearls derived from these shells that are used in ornaments, for these alone can be bored or pierced.[4]

Besides molluscs, the Sukra authors have referred to several tiny insects belonging to the *Invertebrata*. Like the fish, the fly[5] is an object lesson for one of the six *vyasanas* or vices of Hindu Ethics. "The fly gets death by falling suddenly into the lamp, because of its mad passion through gratification of eyes by the light of the wick in a mild lamp." The danger of men from pleasures of *rupa* or sight is thus illustrated by the case of the fly. Similarly, the bee[6] illustrates the danger from *gandha* or smell. "The bee which has the power of cutting holes, and can fly with wings, gets, however, caught within a lotus because of its desire for smell." This lecture on the necessity for the control of the senses and the practice of self-restraint is repeated in the chapter on General Rules of morality: "The antelope, the elephant, the fly, the bee and the fish—these five are ruined through sound, touch, form, smell and taste respectively." So one should duly enjoy these things with restraint.

Another characteristic of bees has been recorded. At the very sight of poisoned food bees[8] begin to hum. This supplies a very good test for the detection of poisons, and is utilised by toxicologists.

Ants and worms have been referred to in Sukranîti—generically to indicate the meanest and minutest creatures of the animal world in the lines describing the ideal of *ahimsâ* or charity, mercy and philanthropy that people should hold before themselves: "One should serve as far as possible people who are out of employment, who are diseased, and who are aggrieved; should always look upon even ants and worms[9] as oneself; and even if the enemy be harmful, should be doing good to him."

SECTION 10.

Agricultural Live-stock in Sukranîti.

We have mentioned above that the *Ungulâtes* of the Vertebrate kingdom supply all the more important animals of domestic, social, and economic life. In this section we propose to deal with the animals specially useful in agriculture. Such animals are (1) Bulls and bullocks, (2) Cows, (3) Buffaloes, both male and female, (4) Sheep, (5) Goats, (6) Horses and ponies, (7) Mules and donkeys, (8) Camels.[1] We have already disposed of sheep and goats in a previous section; and, as in Sukranîti, camels and horses are put specially to military purposes, we reserve their treatment for a subsequent section. Bulls also have been mentioned as draught cattle for the military establishment, but their importance in agriculture and ordinary conveyance is, however, well-known. We proceed, therefore, to cull from Sukranîti all references to cattle, ploughs, carts, &c., that have any bearing on agriculture.

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[1] Sukra IV, vii, 321-24.

[2] Sukra IV, i, 234.

[3] Sukra IV, ii, 117-118.

[4] Sukra IV, ii, 123.

[5] Sukra I, 207-8.

[6] Sukra I, 211-12.

[7] Sukra III, 33-34.

[8] Sukra I, 654-657.

[9] Sukra III, 20-22.

Both agriculture and pasture are included in the list of topics dealt with in the science of *Vârtâ*, which coincides more or less with the modern science or art of Economics. "In *Vârtâ*[2] are treated interest, agriculture, commerce and preservation of cows." As Vârtâ is a branch of learning recognised in the curriculum of studies for princes, we may take it that matters connected with veterinary science, agricultural live-stock, entomology, &c, such as they were, had to be studied by persons who were called upon to rule over the destinies of mankind.

The cattle, however, affect the people more than princes. In *Sukraniti* we therefore have references to agriculture and the breeds of animals employed in it, specially in connexion with the activities of the people. Sukrâchâryya has described the tending of cattle and cultivation of lands as two of the occupations of Vaiśyas,[3] and the driving of plough as one of the occupations of Sudras.[4] It is difficult to see the difference between cultivation of lands and drawing of ploughs, unless the former implies supervision or high class intellectual work in connexion with agriculture, and the latter purely mechanical, manual work. Whether Vaisya or Sudra, the cultivator certainly forms an important member of Sukrâchâryya's social system with his own customs, rites, traditions. It is, therefore, definitely laid down as a juristic principle that "The cultivators should have their disputes[5] decided according to the usages of their own guild, &c." And the drawing of ploughs is a kalâ.[6]

What would be called "Simple Co-operation" in modern phraseology is indicated in the following rule regarding agricultural life: "The women should be assistants[7] in the functions of males, *viz.*, agriculture, &c." We have here a maxim of the Cottage Industry System rendered natural through the organisation of the Joint-Family.

The only reference to the use of cattle in agriculture is in the lines, on the authority of Manu, describing the resort of Brahmanas to this occupation under certain conditions.[8] The conditions are that Brahmans must have 16 animals to their ploughs. Kṣatriyas, when they take to agriculture, should have 12 cows. The normal number, *e.g.*, that for Vaisyas is 8. The Sudras may have 4 cows and the Antyajas 2 only. The difference in the number of cattle to be employed for the same work according to the caste of the worker, seems to have been justified in those days by the idea that, in the case of those whose normal occupations were non-agricultural, *e. g.*, Brahmanas and Kṣatriyas, agriculture should be looked upon when they do take to it, as an *âpaddharma*; and as they are not used to it, they should have as helpmates a larger number of cattle to relieve them of the physical strain than those whose ordinary occupation being manual does not require the extraneous help. The authority of Manu and other sages has been invoked to prove the legitimacy of agriculture being an occupation of Brahmanas.

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[1] In the Punjab, Sind, and Western Rajputana camels are largely used for agricultural purposes instead of bullocks.

[2] Sukra I, 311-12.

[3] Sukra I, 83-84. See also IV, iii, 34.

[4] Sukra I, 85-6.

[5] Sukra IV, v, 35-36.

[6] Sukra IV, iii, 188.

[7] Sukra IV, iv, 54.

[8] Sukra IV, iii, 37-40.

The conditions of good cattle are indicated in the following line:

"The cow[1] with good horns and fine colour, which gives plenty of sweet milk, and has good calves has very high value, whether young, small or large."

The prices are given below:

(1) A good cow costs Rs. 8, *i.e.*, twice the price of a she-goat.[2]

(2) The high price for cows is, however, Rs. 64, or Rs. 80.

(3) The high price of a buffalo[3] is the same as that of the cow or one and a half times that, *i.e.*, Rs. 64 or 80, or 96 or 120.

(4) The high price for she-buffaloes[4] is Rs. 56 or Rs. 64, *i.e.*, lower than that for the male cattle.

The revenue[5] from agricultural cattle is realised at the following rates:

(1) One-eighth of the increase of cows and buffaloes.

(2) One-sixteenth of the milk of she-buffaloes.

The milk[6] should never be received by the king for his own kith and kin.

Carts have been referred to—not, however, in connection with agricultural purposes, but with the military establishment. But ordinary carts are implied in the following proverbs: "It is better to be poor first[7] and rich afterwards, just as it is better to be a pedestrian first and go in a vehicle afterwards." Also, "Pedestrianism is better than using bad vehicles."[8]

We have just noticed that only the cow has been specifically mentioned in Sukraniti as the agricultural live-stock. But much information on this head is not available from it. It requires to be noted, however, that the Sukra authors represent one of those stages in the history of Hindu national sentiment which gave concrete shape to the idea of the cow as a divinity. Thus as one of the most justifiable "grounds for war," according to the principles of International Law advocated by Sukrâchâryya, we read what may be compared with the cry of Sivâji, the great Hindu monarch of the 17th century: "There are no rules about the proper or opportune time and season for warfare in cases created by the killing of cows,[1] women, and Brahmanas." The physical considerations of time, place &c., must not weigh when the most vulnerable point of national honour and feeling has been touched by the adversary.

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[1] Sukra IV, ii, 186-187.

[2] Sukra IV, ii, 188-189.

[3] Sukra IV, ii, 193.

[4] Sukra IV, ii, 196.

[5] Sukra IV, ii, 239-240.

[6] Sukra IV, ii, 253-54.

[7] Sukra III, 569-70.

[8] Sukra III, 572-3. See also the references to carts drawn by horses as the conveyances of commanders and governors. V, 162-9,

It may be possible to find out the age of *Sukraniti* from the history of this "Doctrine of the Divinity and Inviolability of the Cow" as a cornerstone of Hindu socio-religious system. The work must be attributed to a period not preceding the advent of the Musalmans, with their alien creed as a formidable rival to contest the sovereignty of the land with the people of Hindusthan.

It may be interesting to add here that in the western countries also thinkers have been gradually coming to appreciate the Cow-cult in their own way. Thus to quote from the *Encyclopædia Britannica* (Article on Dairy):

> "If civilised people were ever to lapse into the worship of animals, the Cow would certainly be their chief goddess. What a fountain of blessings is the cow! She is the mother of beef, the source of butter, the original cause of cheese, to say nothing of shoe-horns, hair-combs and upper leather. A gentle, amiable, ever-yielding creature, who has no joy in her family affairs which she does not share with man. We rob her of her children that we may rob her of her milk, and we only care for her when the robbing may be perpetrated."

SECTION II.

Economic Zoology in Sukraniti.

The various references in which the Fauna have been mentioned by Sukra authors must have given us an idea of the uses which their countrymen made of the animal world. The importance of animals in military life will be dealt with in the next section. In the meanwhile, we shall mention the odds and ends of the economic zoology of Sukrâchâryya that cannot be covered by all these.

Of course milk is one of the most important products of the animal world. Among the 64 kalâs we have two connected with this, *viz.*, milking[2] and churning. Similarly, ghee is also mentioned in Sukraniti as an article of great economic importance. One of the important items of State Interference in Indian Industry and Commerce seems to have been the prevention of Adulteration of Foodstuffs. We find even Sukrâchâryya combatting this evil.[3] The regulation is given in the following lines: "Falsehoods[4] must not be practised by any one with regard to ghee, honey, milk, fat, &c." Sukrâchâryya's state is a guardian of the people's health and wealth, according to what Sidgwick would call the "Socialistic principle."

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[1] Sukra IV, vii, 453.

[2] Sukra IV, ii, 182.

[3] See the articles on *Adulteration* and *Dairy* in *Encyclopædia Britannica*.

[4] Sukra I, 590-2.

Not these innocent industries only—but even the more cruel and untouchable ones are noticed in Sukranîti. Thus, in addition to the above two kalâs, we have three more connected with animal life in the list of 64 arts:

(1) Softening of leathers.[1]

(2) Flaying of skins from the bodies of beasts.[2]

(3) Extraction of oil from flesh (fats).[3]

It is to be understood, as a matter of course, that the chemical and mechanical processes allied or auxiliary to the above industries must also have been well-known.

Commerce and Industry in leather must have been important enough. We do not find any reference to fishermen as a class or fishing as an occupation, as we have already noted. But we read of bird-catchers and leather merchants[4] among other classes of persons who deserve state encouragement.

And at least one product of the leather-industry was in universal demand, *e.g.*, shoes. Thus, among the general rules of morality to be observed by both people and princes, we have the following: "One should always bear medicinal substances in jewels, &c., consecrated by mantras, have umbrellas and shoes,[5] and walk in the streets with eyes fixed on the straight path only." Here we have the ideal of material life that a gentleman of the Sukra-days was expected to follow; and shoes form an item in what would have been regarded as the 'proper' or decent dress of a householder. That the use of shoes was common enough would be evident from the following happy adage of Sukrâchâryya also: "It is better to cover feet with shoes[6] than try to cover the whole earth with leather."

Flesh or meat as a diet is known to the Sukra authors, but, like fishing, eating it is a purely local custom confined to the artisans and artists of Madhyadesa.[7]

Worms and Insects[8] as destroyers of grains are known to Sukra authors. They have advised the king not to accumulate for future use those that have been thus attacked by pests. Information, however, is not copious.

Dr. Râjendralâl has pointed out in his Essay on Dress and Ornament in Ancient India that, among the presents brought by princes and potentates of various parts of India to king Yudhisthira, referred to in the Sabhâparva of the *Mahâbhârata*, various skins are mentioned. The skins of animals that lie in holes, and of wild cats, *i.e.*, the furs of varieties of martin and weasel families, were brought by the Kambojas of the Hindu Kush; Blankets by the Abhiras of Gujrat;

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[1] Sukra IV, iii, 180.

[2] Sukra IV, iii, 181.

[3] Sukra IV, iii, 187.

[4] Sukra II, 409-407.

[5] Sukra III, 8-9.

[6] Sukra III, 574.

[7] Sukra IV, v, 9-496.

[8] Sukra IV, iii, 56-57.

Clothes of the wool of sheep and goats or thread spun by worms (silks) by the Scythians, Tukhâras and Kankas; housings for elephants by princes of the Eastern tribes, lower Bengal, Midnapur, and Ganjam. Pâṇini also, has not only given words for wool, cotton, weaving, cloth, turbans, sewing, &c., but also for gives a special rule (IV, iii, 42). Woollen stufts and furs as well as silks are silk for which he mentioned by Vâlmiki among the constituents of Sitâ's trousseau (Râmâyana, I, 74). It may also be added that animal products, *e.g.*, the hair of Yak, Gour, Gayal and other bovine animals living in hills were used in the manufacture of one species of *châmaras*, or fly-flappers, described in the Yukti kalpataru as one of the most important insignia of royalty. Some idea of Economic Zoology may be formed from the fact that the author mentions the Meru, Himâlaya, Kailâsa, Malaya, Vindhya, Gandhamâdana and other mountains as the habitats of the animals yielding the requisite hairs of various kinds.

Dr. Râjendralâl has described some of the shoes and boots in Hindu India in his *Indo-Aryans*. We know the tender story of Bharata's placing a pair of Râma's slippers on the vacant throne of Ayodhya to officiate for him during his exile. Mediæval Sanskrit authors allude to them pretty frequently. The *Viṣṇu Purâṇa* enjoins all who wish to protect their person never to be without leather shoes. Manu forbids the use of others' shoes (IV, 66), as Sukra considers the use of others' gold and jewels, &c., as a *chhala* or social offence. The Purâṇas recommend the use of shoes in thorny places and on hot sand. Arrian notices the Indian shoes made of white leather, which, according to the description given, may be identified with the Uriya shoes of to-day. According to Mitra the material for these boots and shoes was bovine leather, and even the hide of sacrificed cattle. Âswalâyana quotes Sânvatya (IV, ix, 24) to mention the fact that the hide of cattle sacrificed in Sulgava ceremony is fit to be converted into shoes and other useful articles. So also hog-skin is a fit material for shoes according to a Vedic verse quoted by Savara Swâmi in his commentary on the Mimâmsa aphorisms. Râjendralâl also mentions leather bottles, leather jars (*dritis* in Manu), leather straps, strings and bands, leather sails, &c.

The following extract from Mr. Law's *Hindu Polity* based on the Arthasâstra of Kautilya would give an idea of the Economic Entomology or agricultural Zoology of the Hindus in the 4th cent. B. C. " It should be remarked that measures for the extermination of pests were also undertaken by Government. These pests generally included rats, locusts, injurious birds and insects and tigers. To destroy rats, cats and mungooses were let loose ; some varieties of poison were also used for the purpose. To kill tigers, several kinds of posion were in use."

On the strength of evidences from Tamil sources bearing on South Indian life of the early Christian era, Aiyangar says[1] : " Among the woollens we find mention of manufactures from the wool of rats which was regarded as particularly warm. There are 30 varieties of silks mentioned, each with a distinctive appellation of its own, as distinguished from the imported silks of China which had a separate name."

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[1] *Ancient India p. 65.*

Marco Polo (1792 A.D.) describes Cambay as a port with "great trade in hides, which are very well-dressed."

According to the *Dharma Sutra* of Baudhâyana (i. 2.4), traffic in wool and in animals with two rows of teeth (horses, mules, &c.) is a forbidden practice in the Dravidian districts,—the locale of this work according to Buhler,—but is common among the "Northerners" (*i.e.*, Western and North-western India, according to the geographical terminology of those days recorded by Hiuen Thsang also).

The following extract from the *History of Indian Shipping* pp. 77-78 relates to the traffic in animals in ancient times: "Lastly, there are several other *Jâtakas* in which we are told explicitly of a successful, if sporadic, deal in birds between Babylon and Benares, and of horses imported by hundreds from the North and from Sindh." The author quotes *Tandulanali Jâtaka*, *Suhanu Jâtaka*, *Kundaka-Kucchi-Sindhava-Jâtaka*, *Bhojajanuya-Jâtaka* and *Ajanna Jâtaka* and also Mrs. Rhys Davids' articles in *Economic Journal* and J. R. A. S. for 1901. In the days of Solomon also Indian peacocks, &c., found customers in Syria.

Prof. Mookerji quotes the *Baveru-Jâtaka* and the opinions of Buhler, Rhys Davids and Kennedy to show that peacocks were first taken to Babylon by Indian sea-going merchants in the 6th cent. B.C.

SECTION 12.

The Animal Corps in Sukraniti.

Horses, elephants, camels and bulls constitute the animal-corps of the Sukra state. The general rule about the relative proportion of these animals in the army is given in the following line: "The king should have in the army a predominance of footsoldiers, a medium quantity of horse, a small quantity of elephant force, equal number of bulls and camels, but never elephants in excess." This is stated more definitely as follows:[2]

Infantry	should be	4	times horse.
Bulls	"	$\frac{1}{5}$	"
Camels	"	$\frac{1}{8}$	"
Elephants	"	$\frac{1}{32}$	"

Thus the number of elephants is to be the smallest, the bulls and camels may be equal in amount or differ as $\frac{1}{5}$ or $\frac{1}{8}$ of horse.

The idea of Sukra statesmen is clearly known from the statement of the constituents of the Army in a state whose annual income is Rs. 1,00,000. The ruler of such a state[3] is advised to have

(1) 80 horses.
(2) 10 camels.
(3) 2 elephants.
(4) 16 bulls.

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[1] Sukra IV, vii, 45-6.

[2] Sukra IV, vii, 41.

[3] Sukra IV, vii, 47-52.

The budget of expenses on the military live-stock of this "unit" of political life is explicitly stated to be as follows:—

(1) Horse (and Foot)	Rs.	48,000 per year.
(2) Elephants, Camels, Bulls (and Fire-arms)...	"	4.800
Total Rs. ...		52,800

The importance of the department of live-stock to the state would be evident from the fact that, together with (1) the Infantry and (2) the Fire-arms and other accessories, *e.g.*, chariots, carts, &c., the horses, elephants, camels and bulls constitute more than half of the permanent charges upon the finances of the kingdom. It is clear, therefore, that all Hindu financiers and statesmen, as well as rulers must have made themselves thoroughly well-grounded in the knowledge of habits, habitat, feelings, rations, stabling, embryology, anatomy, external characteristics, health, prices, classes, measurements, mettle, &c., of the live-stock. It is this which explains the abundance of Zoological lore among the Hindus, and the production by their scholars of works on economic zoology, veterinary science, physiology, &c., dealing with all the theoretical and practical or scientific and utilitarian aspects of Indian Fauna.

Besides the purely military uses of these animals, Sukraniti records some other uses also. The following reference to the animal-force indicates non-military as well as military uses: "The elephant,[1] the camel, the bull, the horse are excellent beasts of burden in the descending order. Carriages are the best of all conveyances except in the rainy season."

The use of horses for purposes of conveyance is further referred to in what looks like modern "horse-allowances" described in the following lines: "(1) The master of 10 villages, and the commander of 100 troops should travel on horseback with attendants; (2) The master of one village also should be a horseman; (3) The commander of 1,000 troops and the ruler of 100 villages should each have the conveyance of a chariot or cart and a horse, and 10 armed attendants should travel on horseback. (4) The ruler of 1,000 villages should always travel in vehicles carried by men or two horses. (5) The ruler of 10,000 villages can use all vehicles and four horses."

The use of elephants, also, as conveyance is granted to the "dignified parts" of the state: "The commander of 10,000 troops should travel on an elephant[3] with 20 attendants."

The references to carts or carriages drawn by horses should be noted.

Horse-Sacrifices have also been incidentally mentioned in *Sukraniti*. "Can virtue that is begotten of *aśwamedha*[4] come out of mere recital of hymns? So also, can the virtue arising from mercy come out of punishments?" The analogy is quite worthless, however. The horse to be used in the sacrifice would perhaps be called *Śyâmakarṇa*[5] according to the taxonomy in Sukraniti.

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[1] Sukra IV, vii, 352-53.

[2] Sukra V, 162-168.

[3] Sukra V, 167.

[4] Sukra IV, i, 108-9.

[5] Sukra IV, vii, 221-22.

[6] Sukra I, 622.

So also the religious ceremony in connexion with the *utsarga* or letting out or consecration of bulls is referred to. There is a law of the land regulating the people's action with regard to the custom: "Those who have let out bulls and other animals (after religious observances) must keep them within proper control"; *i.e.*, the animals must not be allowed to destroy public property or cause damages to the interests of the citizens.

The following is a general rule of morality to be observed by pedestrians while walking, and indicates the degree of danger that is to be feared from the animals: "One should keep 5 cubits from the carriage, 10 cubits from the horse,[1] 100 cubits from the snake, and 10 cubits from the bull."

Like the goats, the bulls are also known to Sukra authors to be stupid animals. Thus those kings are almost like oxen[2] (*i.e.*, fools) by whom their strength (army) is not increased, by whom princes are not made to pay tribute, and by whom subjects are not well-protected.

The elephant has left its deep mark on Hindu thought. Both Literature and Fine arts of the Hindus have preserved the most characteristic representations of this animal's internal and external features The rut gushing out of the elephant is a conventional symbol with Hindu poets for the excitement of passion in both physical and moral worlds. The havoc created by the animal in fury has also been the theme of many a noble specimen of Hindu sculpture and literature.

The moral lessons illustrated by the Sukra authors from the habits of this animal are given below: —

(1) There is a complete analogy between the processes of training elephants and the senses of man. "One should bring to bay or discipline, by the hook of knowledge, the elephant[3] of the senses which is running to and fro in a destructive manner in the vast forest of enjoyable things." This simile about wild and unbroken elephants is one of the most common devices in Sanskrit literature.

(2) The elephant is the object lesson, among other things, of the danger from the weakness of Touch-enjoyment: "The elephant[4] whose stature is like the peak of a mountain and who can uproot trees with ease, is, however, caught, because of the pleasure of contact with the female." This is expressed again, in the following: "The antelope, the elephant,[5] the fly, the bee, and the fish—these five are ruined through sound, touch, form, smell and taste."

Two professions have been incidentally noticed here, *e.g.*, those of catching and training the elephants.

The elephant is known to be proverbially huge and strong. "It is only the powerful elephant,[6] that can extricate an elephant from the mud. So also, it is a king who can deliver a king who has gone astray." Again, "The elephant[7] cannot be bound by thousands of bales of cotton."

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[1] Sukra III, 281-2.

[2] Sukra I, 205-6.

[3] Sukra I, 249-50.

[4] Sukra III, 33-34.

[5] Sukra I, 193-94.

[6] Sukra IV, vii, 834-35.

[7] Sukra IV, vii, 833.

But the elephant is no match for the lion : "Just as even the tiger and the elephant[1] cannot govern the lion—the king of beasts—so all the councillors combined are unable to control the king, who acts at his own sweet will."

We have already referred to the use of elephants as conveyance granted to the very high officials of the state. It is also advised that " the king should tour the city on the back of an elephant,[2] in order to please the people."

SECTION 13.

Horses.

(*a*) *External Anatomy.*

The anatomy and external characteristics of horses were very minutely studied. The fact that the Hindus laid down mathematically accurate rules for the artists to follow and demanded of them a strictly religious observance of those rules presupposes, and is an evidence in favour of, the view that they were past masters in anatomical surveys of the human and animal bodies. To those who would construct the images of horses, Sukrâchâryya's advice is: " If an image is to be made, the appropriate pattern or model should be always placed in front. No image can be made without a model. So the artist should frame the limbs after meditating on the horse[3] and finding out the measurements and attributes of horses in the manner indicated above." " In horses all limbs are made according to a certain proportion with the face."

The measurements of horses' limbs given by Sukrâchâryya will be explained in the section on the anatomy of the vertebrates.

(*b*) *Mettle and Worth.*

The appreciation of horses and their classification according to merit depend on the consideration of the following circumstances, both zoological and economic : (1) measurements of limbs, (2) certain general aspects and physiognomical features, and (3) marks on the animal's body, *e.g.*, feather-rings, &c., which are known to be auspicious or inauspicious, also (4) the place from which they come. But this last has not been described in Sukranîti.[4]

According to the measurements of limbs, we get the following tradition recorded by Sukra authors :

(1) The best horse[5] has a face of 24 angulas or inches.
(2) The good „ „ 36 „ „ „
(3) The medium „ „ 32 „ „ „
(4) The inferior „ „ 28 „ „ „

[*N. B.*—5 yavas=1 angula, according to Sukra.]

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[1] Sukra IV, vii, 830-31.

[2] Sukra I, 744.

[3] Sukra IV, vii, 145-8.

[4] *Vide* Law's *Hindu Polity*, p. 36.

[5] Sukra IV, vii, 86-89.

The limbs which are to have a fixed proportion with the face should have the following measurements :

(1) Stature[1] is to be 3 times face.
(2) Length „ 4⅓ „
(3) Girth or Circumference of belly 3 times face+3 angulas.

The measurements given by Sukrâcharyya differ from those given in Chânakya's *Arthasâstra*,[2] as well as in *Aswavaidyaka.*[3]

The classification of horses, according to general physiognomical features, has been elaborately treated under 50 heads by Jayadatta in the third chapter of his *Aswavaidyaka*. In his notes on this chapter, Pandit Umeshchandra Gupta has quoted passages from Nakula's veterinary science, *Agnipurâna*, *Brihat Samhitâ*, *Hârâvali*, *Amarakośa*, and *Hemachandra*, but specially from *Sukranîti*. The extracts show similarity as well as divergence of ideas on the subject.

The general characteristics of horses regarding features, colour, gait, &c, appreciated by Sukra authors are indicated below :—

(1) That horse is beautiful[4] which has a high neck and a low back.

(2) The horse[5] with divine attributes, or excellent horse is that which has a beardless face, beautiful, smart and high nose, long and high neck, short belly, heels and ears, very swift speed, voice like the cloud and the gander or swan, is neither wicked nor very mild, has good form or colour and beautiful circular rings of feather.

(3) The following horses are disparaged:

(i) those with black legs, or with one white leg,[6]
(ii) those rough, grey-coloured or ash-coloured,[7]
(iii) those with black roof of mouth, black tongues, black lips; or throughout black but with a white tail,
(iv) those with one white mark on the forehead, but throughout coloured otherwise—(called *Dalabhanji*),[8]
(v) those that throw kicks, make sounds with lips, shake their backs, tend to go down into water, suddenly stop in the midst of a movement, lie down on the back, move backwards and leap up,[9]
(vi) those that have snake-like tongues, the colour of bears and are timid in character,[9]
(vii) those with marks on the forehead disfigured by a minute blot (of another colour),[9]
(viii) those which tear asunder the ropes[9] (cf. IV, vii, 217).

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[1] Sukra IV, vii, 91-95.

[2] See Law's *Hindu Polity*, p. 38.

[3] Chapter III, 181-188, published in the *Bibliotheca Indica* Series.

[4] Sukra IV, vii, 144.

[5] Sukra IV, vii, 149-53.

[6] Sukra IV, vii, 225.

[7] Sukra IV, vii, 226-28.

[8] Sukra IV, vii, 234-35.

[9] Sukra IV, vii, 328-31.

(4) Defects of colour (whether one or variegated) are not considered, if the form be beautiful.[1]

(5) So also the presence of bad hair-marks on the body is not minded if the animal is strong, has a good gait, is well-formed, and not wicked.[2]

(6) The following movements of horses are appreciated:[3]

(i) with legs thrown from a height,

(ii) gait like those of tigers, peacocks, ducks, parrots, pigeons or doves, deer, camels, monkeys and bulls. *Aswavaidyaka* also bears this out.

(7) One of the most practical tests of good horses is given by Sukra; thus, if the horseman does not get tired by riding a horse even after over-feeding and over-drinking, the gait of the horse is known to be excellent.[4]

The value of horses in terms of money, *i.e.*, their prices, according to Sukra authorities, are given below :—

(1) The high prices for horses and elephants is 2000, 3000 or 4000. Now a silver pala=8 *tolas* or rupees. Therefore, the price is 16,000, 24,000, 32,000 rupees. This seems to be extraordinary, especially from the following estimation of the best horse. Hence, the figures 2,000, 3,000, 4,000, are to be taken to indicate not *palas*, but silver *tolas* or rupees.

(2) The best horse is that which can go 100 *yojanas* (500 or 700 miles) a day. Its price is 500 gold (coins) *i. e.*, Rs. 8,000.

The price of horses according to Sukra Statistics would, therefore, normally range from Rs. 2,000 to Rs. 8,000.

(*c*) *Omens.*

The third consideration which weighs much in the valuation of breeds of horses is the presence or absence of ringlets, curly-feathers, hair-marks, pimples &c on the body of the animal. These have been described thoroughly with all their significance in LXVI and XCIII chapters of *Brihat Saṃhitâ*, as well as the chapter on marks in *Aswavaidyaka* previously referred to.

According to the Hindus the marks are good or bad omens,[5] and may be interpreted to indicate the character, qualifications, disposition, as well as future social or economic condition of men over whose bodies they appear.

The science of omens relates to the animals also, and what is more, foretells adversity or prosperity of their masters. It is natural, therefore, that the subject was minutely studied in those days. Thus Varâhamihira begins his discourse on omens [6] with a short historical treatment of the science:

" Riṣabha has written a treatise on omens embodying the views of the gods Sukra, Indra, Brihaspati, Kapisthala, and Garuda, and of the Riṣis Bhâguri, Devala and others. Sri Devavardhana, the Maharaja of Avanti (Ujjayini) has written a treatise on omens, embodying the views of Bharadwâja. There are also treatises on omens by the seven Riṣis. Numerous treatises are also found on the subject written in ancient and modern languages. Then there are the treatises of Garga and others who have written works on Saṃhitâ. There are also treatises by writers who have written on Yâtrâ. Having examined all the above treatises, I proceed to write clearly this brief treatise on omens for the enlightenment of my pupils."

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[1] Sukra IV, vii, 224, 236-37.
[2] Sukra IV, vii, 229-31.
[3] Sukra IV, vii, 238.
[4] Sukra IV, vii, 232-33.
[5] Varâhamihira has dealt with this topic in LV. of Brihat Saṃhitâ,
[6] Sukra IV, vi, Brihat Saṃhitâ, LXXXVI, 1-4.

Our author has been referred to by Varâhamihira as an authority in the above bibliography. It appears Sukrâchâryya was a founder of this science. *Sukraniti* is perhaps the most elaborate of Niti-or Dharma-or Artha-âstras in the treatment of the subject, as would be evident from the references given below. It should be mentioned that the Sukra authors, Varâhamihira, Nakula and Jayadatta do not all agree in the valuation or enumeration of the marks or omens connected with the features of horses.

The *bhramaras* or *âvartas*, *i.e.*, marks on the horses' body consisting of feather-curls or hairy growths may be (1) circular—like ringlets, or (2) of any shape and size, as indicated by the following substances :[1] Conch, wheel, mace, lotus, altar, seat of meditation, palace, gate, bow, pitcher full of water, white mustard seeds, garland, fish, dagger and Srivatsa gem.

These 16 are known to be auspicious signs. As for the circular ones, their significance, good or evil, is to be known from the following general rules :

(1) These may be (i) leftwards or rightwards, (ii) full or partial, (iii) small or large.[2]

(2) In the female horse, the leftward or anti-clockwise ring is auspicious ; in the male the rightward or clockwise.[3]

(3) The results vary also with the directions in which they are formed, *e.g.*, downwards, upwards or oblique ; [4] thus on the leg the downward mark is good, on the forehead the upward.[5]

These general remarks on hairy growths, whether circular or shaped like the objects enumerated above, have been the basis of a classification of horses according to merit. This is dwelt on more elaborately as below :

(1) *Excellent* horses[6] are those that have these marks on (i) nose-tip, (ii) forehead, (iii) throat, (iv) head.

(2) *Good* or *Middling*[7] horses are those that have such marks on (i) breast, (ii) neck, (iii) shoulder, (iv) waist, (v) navel, (vi) belly, (vii) front of the

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[1] Sukra IV, vi, 159-11.

[2] Sukra IV, ii, 154-55.

[3] Sukra IV, vii, 156-57.

[4] Sukra IV, vii, 158.

[5] Sukra IV, vii, 212.

[6] Sukra IV, vii, 162-163.

[7] Sukra IV, vii, 164-5, 203-05. There is a repetition of waist and sides in the two references.

sides, (viii) back, (ix) lower lip, (x) space between ear and eye, (xi) thighs, (xii) forelegs.

(3) *Bad* horses[1] are those that have marks on (i) eyes, (ii) jaws, (iii) cheeks, (iv) breast, (v) upper lip, (vi) kidney, (vii) knee, (viii) genital organ, (ix) hump of the back, (x) right waist, (xi) right foot.

A few more good and bad marks are enumerated below :—

(*a*) *Good*:

(i) If two marks are noticed on the cheeks of a horse, they lead to the increase of the master's fame and territory.[2]

(ii) Two marks on the forehead with space between indicate good, and are like the sun and the moon. If they overlap, they give medium results.[3]

(iii) Three marks on the forehead with space between them, one being on the top, are indicative of good.[4]

(iv) One mark in the middle of the throat[5] is very auspicious and prevents all harms.

(v) On the leg the downward mark is good, on the forehead the upward.[6]

(*b*) *Bad*:

(i) The horse that has a mark on the left cheek is wicked and leads to loss of wealth.[7]

(ii) If the horse has marks in the mouth (or face?) or at the end of the belly, it is sure to get death or cause ruin of the master.[8]

(iii) The marks on knees give troubles of life abroad.[9]

(iv) The mark on the genital organ causes loss of[9] victory and beauty.

(v) The mark at the end of the vertebral column means total ruin.[9]

(vi) If on the forehead two marks be too contiguous, they are inauspicious.[10]

(vii) Three triangular marks on the forehead are causes of grief.[11]

(viii) The mark on the back of the genital organ or on the nipple or near the ear[12] is bad.

(ix) The horse that has an upward mark[13] on the leg is disparaged as the uprooter of posts.

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[1] Sukra IV, vii, 200-2. It has to be noted that there is a contradiction in this enumeration with that in 162-65 as regards navel, waist and throat.

[2] Sukra IV, vii, 174-75.

[3] Sukra IV, vii, 206-7.

[4] Sukra IV, vii, 208-9.

[5] Sukra IV, vii, 211.

[6] Sukra IV, vii, 212.

[7] Sukra IV, vii, 180.

[8] Sukra IV, vii, 191-2.

[9] Sukra IV, vii, 193-5.

[10] Sukra IV, vii, 207,209.

[11] Sukra IV, vii, 210.

[12] Sukra IV, vii, 214-15.

[13] Sukra IV, vii, 217.

(*d*) *Breeds.*

The artificial taxonomy of horses according to the adventitious marks on their bodies has created along with it a system of nomenclature also, which, according to Hindu tradition, again, is a good index to the quality, mettle and other characteristics of horses. In Sukranîti we have the technical names of the following classes or breeds :

(1) *Purṇaharṣa*[1]—with two marks on the brow and a third on the head.

(2) *Suryya*[2]—with a mark on the backbone—leads to the increase of master's horses.

(3) *Trikuta*[3]—with three marks on the forehead—leads to the increase of horses.

(4) *Vâjisa*[4]—with three marks on the neck—is the lord of horses in the royal stable.

(5) *Sarvanâma*[5]—with only one mark on the cheek—leads to the owner's ruin.

(6) *Siva*[6]—with a mark on the right cheek—leads to the happiness of the master.

(7) *Indra*[7]—with two spots on the ears—gives victory in wars and leads to happiness.

(8) *Vijaya*[8]—with marks on the nipples—gives victory in wars and leads to happiness.

(9) *Padma*[9]—with two marks on the side of the neck—brings several *padmas* (Padma = one thousand billions) of wealth as well as unceasing happiness to the master.

(10) *Bhupâla*[10] or *Chakravarti*—with one or three marks on the nose.

(11) *Chintâmani*[11]—with one large mark on the throat—leads to the realisation of the desired objects.

(12) *Sulka*[12]—with marks on the forehead and the throat—gives increase and fame.

(13) *Dhumaketu*[13]—with a mark at the origin of the tail—is ruinous.

(14) *Kritânta*[14]—with a mark on the rectum, the tail and the end of the vertebral column.

(15) *Ekaraṣmi*[15]—with a mark on one of the upper sides of the neck.

(16) *Panchakalyâna*[16]—with five white marks on the face and four legs.

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[1] Sukra IV, vii, 166-7.

[2] Sukra IV, vii, 168-9.

[3] Sukra IV, vii, 170-1.

[4] Sukra IV, vii, 172-3.

[5] Sukra IV, vii, 176-7.

[6] Sukra IV, vii, 178-79.

[7] Sukra IV, vii, 181.

[8] Sukra IV, vii, 182.

[9] Sukra IV, vii, 184-5.

[10] Sukra IV, vii, 186-7.

[11] Sukra IV, vii, 188-9.

[12] Sukra IV, vii, 190.

[13] Sukra IV, vii, 196-7.

[14] Sukra IV, vii, 198-99.

[15] Sukra IV, vii, 216.

[16] Sukra IV, vii, 219.

(17) *Aṣṭamangala*[1]—with the five white marks of Panchakalyâna, and three more white, *e.g.*, on the breast, neck and tail.

(18) *Śyâmakarṇa*[2]—with one colour throughout the body, but with ears coloured *śyâma* (*i.e.* greenish, swarthy, &c). If that one colour be white, the horse is sacred and deserves to be worshipped.

(19) *Jayamangala*[3]—with eyes like *vaiduryya* gem.

(20) *Dalahbanji*[4]—with one very white mark on the forehead, but coloured otherwise throughout—brings contempt upon the owner.

A classification of animals which has been adopted in the case of elephants has not been recorded by Sukra authors with reference to the horses. This has, however, been noticed in the Arthasâstra.[5] Thus, horses were regarded as belonging to the three classes or types of *tikṣṇa* (fiery), *bhadra* (gentle) and *manda* (sluggish).

It is also strange that Sukra authors should have omitted altogether a very important mode of economic classification of horses, *e. g.*, that according to their places of origin. The *Aswavaidyaka* has devoted a whole chapter[6] to this topic, called the chapter on *janmadesa* or Habitat or Zoological Distribution, as we would call it in modern times, and deals with the subject under nine heads: *e.g.* (1) good horses, (2) second-class horses, (3) worst-class horses, (4) *Tâjika* horses, (5) *Pârasika* horses, (6) *Kekkana* horses, (7) *Turaska* horses, (8) *Bhândaja* horses, (9) *Saindhava* horses, &c.

The Arthasâstra,[7] also, mentions the following classes of horses, according to their natural habitats: (1) Kâmboja (Afghanistan) (2) Sindhu (Sindh) (3) Âratta (Punjab, according to Cunningham, p. 215), (4) Vanâyn (Arabia), (5) Bâlhîka (Balkh), (6) Sauvira (Eder in Guzrat, according to Cunningham, or Sophir of the Bible), (7) Pâpeye, (8) Taitala.

Of these places the first four were held to supply the best breed, and the remaining four the horses of the second quality. Horses of inferior quality came from other sources.

It may be mentioned here that almost all the places enumerated by Kautilya have been noted by Vâlmiki in the *Bâlakânda* of the Râmâyaṇâm (Canto VI, 22).

Trade in horses[8] seems also to have been a feature of South Indian commercial life in the 1st cent. A.D. Thus in the *Periplus* we have the description of Puhar, a port on the East coast, where "horses were brought from distant lands on the seas."

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[1] Sukra IV, vii, 220.

[2] Sukra IV, vii, 221-2.

[3] Sukra IV, vii, 223.

[4] Sukra IV, vii, 234-35.

[5] Law's *Hindu Polity* p. 36.

[6] *Vide* the 6th chapter of the work in the *Bibliotheca Indica* Series. This throws much light on the Economic or Commercial Geography of ancient India.

[7] Law's *Hindu Polity*, pp. 36-37.

[8] Aiyangar's *History of India*, p. 66.

(c) *Training and Management.*

Lt. General Sir Fitzwygram deals with the construction and ventilation of stables, stable fittings, watering and feeding, forage, grooming, shoeing, exercise, and stable management in part I of his work, "Horses and Stables." All these topics are the subject-matter of Jayadatta's *Aswavaidyaka* in several chapters, and have been described more or less in all Hindu treatises, called Arthsâstras or Nitisâstras, which have been handed down from at least the 4th century B.C.

It is, however, only during the last hundred years that, owing to the "enormous losses[1] produced by the ignorance of the true origin of disease, veterinary art has been recognised as second only in its usefulness to the care of human life." * * * "In the increasing value of domesticated animals useful to man, and in the greater ravages of disease, as must be the case where animals, more or less intended to roam at large, are crowded together; as must be the case where land increases in value, and where also population increases in numbers and daily requires larger supplies of food; in the increasing value and need of domestic animals, and in their increasing ailments arising from domestication, modern veterinary science has had its rise."

The humanity of the Hindus, as displayed in their care for animals since at least the 6th century B. C.—the epoch of the founders of Buddhism and Jainism—as well as the progress of their knowledge about animal-life, medical treatment of the dumb creatures, and the social, economic and political importance of Fauna, constitutes one more of the solid evidences regarding the great advance of the people of Hindusthan in spirituality and material civilisation, long before the "strong Son of God, immortal Love" flourished under the "Syrian blue." The unfounded remarks of Western scholars explaining away, without rhyme or reason, the antiquity of the original achievements of the Hindus in secular and physical sciences or arts, require, in the light of more rational and unbiassed investigations which they pretend to monopolise, only to be mentioned to prove their absurdity. It is strange that sentiments—for they are no better than sentiments—engendered by race-pride and colour-prejudice, like the following, expressed in the most categorical fashion and sweepingly general terms, should find a place in a scientific work like the *History of Mathematics*[2] published in the first decade of the 20th century:—

"The Hindus, like the Chinese, have *pretended*[3] that they are the most ancient people on the face of the earth, and that to them all sciences owe their creation. But it would appear from all recent investigations that these *pretensions*[3] have no foundation; and in fact *no*[3] *science or useful art* (except a rather fantastic architecture and sculpture) can be traced back to the inhabitants of the Indian peninsula prior to the Aryan invasion. This invasion seems to have taken place in the latter half of the 5th century[1] or in the sixth century."

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[1] Fitzwygram's *Horses and Stables* (Longmans, Green & Co., London, 1911), Fifth Edition, pp. 512-513.

[2] By Ball (Macmillan & Co., London, 1908), Fourth Edition, p. 146.

[3] Tho *Itaics* are ours.

To return to the topics of horse training and management in *Suktaniti*. Sukrâchâryya says, as we have noted in a previous context: "The elephant, the horse,[2] the bull, the child, the wife, and the parrot get the qualities of their teachers through association." The staff connected with the management of horses consists of three classes[3] of men : (1) *aswâdhipati* or superintendent of cavalry, (2) *siksaka* or trainer, (3) the *sevaka* or groom. These, together with other items in the administration of the cavalry, will be treated of in the section on organisation of the Veterinary Department.

Some general observations[4] regarding forage, exercise, &c for horses are given below :—

(1) Defects grow in horses through long-continued absence of work. But through excessive work the horse grows lean and emaciated.

(2) Without bearing burden, the horse becomes unfit for any work

(3) Without food, the horse becomes sickly, but with excessive feeding, it contracts disease.

(4) It is the good or bad qualifications of the trainer that give the horse good or bad gait.

We may compare these practical rules about grooming and training with those of a modern specialist[5] which apply especially to race-horses in India :

"(1) It is most important that the trainer should recognise the fact that he can greatly increase a horse's speed by practice.

"But experience teaches us that we must be very careful in applying the fact, that speed can be greatly increased by practice, to horses ; because, if we push it to an undue extent, they will be apt to become disgusted with their work, and may refuse to "try."

"(2) I am much averse from the plan of throwing sound, healthy horses altogether out of training during the summer, for hard condition once lost takes a long time to regain. A sound horse should get all through the hot weather a fair amount of healthy work.

"(3) The trainer, while supplying the horse with food suitable for the requirements of his system, when undergoing severe work, should never lose sight of the fact that the proper assimilation of such food can only be ensured as long as the functions of digestion are in a healthy state.

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[1] What is the meaning of this date? This bit of recent investigation deserves a place by the notorious feat of Dugald Stewart in proving the Sanskrit language to be an invention of the crafty Brahmans!

[2] Sukra III, 582-3.

[3] Sukra II, 260-63, 270-73, 274-75.

[4] Sukra IV, vii, 239-43.

[5] Haye's *Training and Horse Management in India* (Longmans, 1905), pp. 150, 151, 164, 170, 172.

"(4) Horses should be made to walk smartly. Nothing looks slacker or causes an animal to walk in a more slovenly manner than the way syces often lead horses, with a long rein or rope over their shoulder, while they hobble along in front at the rate of about two miles an hour."

(*f*) *Grooming.*

The theory of grooming has been explained by General Fitzwygram[1] in his answer to the question—"why does the stabled horse require constant grooming, whilst the same horse turned out into a field does well enough without it?" "It is the work and the food, not the shelter," says he, "which constitutes the difference between the domesticated animal and the horse in a state of nature. * * * As long as the horse remains in a state of nature, taking only the exercise required for gathering his food, and feeding only on laxative diet, grooming is not needed, because the debris of the food and the excretions of the system are carried off mainly by the action of the bowels and the kidneys. The cart horse, whose work is slow, can get on with very little grooming. The hunter and the race horse, on the other hand, whose whole systems are developed to the utmost, require much more grooming than is necessary for carriage and ordinary riding horses. * * * Cavalry horses in camps require grooming just as much, and in some respects more than they do in barracks. * * * Grooming, or in other words, cleanliness of the skin, is not, as many suppose, a mere matter of appearance, or of a rough or smooth coat; but it is essential to the general health and condition of the domesticated animal."

It is remarkable that the Sukra authors, who have been writing mainly of the cavalry horses, should have been well-acquainted with the physiological aspects of grooming, as would be evident from the particular care they have insisted on the syces and servants in attending to the rations, health and comfort of the animals under their charge. The following rules of Sukrâcháryya about shampooing, washing, cleaning, &c., as well as feeding and exercise connected with the art of grooming, testify to their thorough grasp of the subject and may be compared with the most recent ideas about it.

(1) The horse that has got fatigue through work should be given a slight stroll for sometime, then should be fed upon sugar and powdered grains mixed with water.[2]

(2) The horse should be given *gur* (molasses) and salt just after work, before the saddle and fittings are brought down. Then when the sweat has disappeared, and it has stood calm and quiet the horse should be relieved of its fittings and reins.[3]

(3) The horse should be made to stroll in the dust after its limbs have been rubbed, and carefully tended with baths, drinks and foods[4].

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[1] *Horses and Stables*, pp. 66-7.

[2] Sukra IV, vii, 270-71,

[3] Sukra IV, vii, 275-78.

[4] Sukra IV, vii, 29-80.

(4) If the horse be made to carry burden, just after taking food and drink, it soon gets coughs, breathlessness and other diseases.[1]

General Fitzwygram[2] appreciates the Indian method of grooming in the following words:

"In India the native groom often cleans his horse by hand-rubbing or shampooing. The practice is good and has an excellent effect on the skin. It would be difficult, probably impossible, to get English grooms to adopt a practice so novel. But * * * the author believes the practice would be found most beneficial. The action of the hand never irritates the skin, which the brush frequently does."

(*g*) *Forage.*

We have just noted that according to modern Physiology and Hygiene feeding and grooming cannot be dissociated from each other and do in fact form two inter-connected functions of one and the same work, *viz.*, tending of domesticated horses. The treatment of food must inevitably come hand in hand with the other aspect of the general art of tending. It is perfectly natural, therefore, that rations of horses, and their cleaning, rubbing, washing, &c., have been dealt with by Sukra equestrians as an organically blended topic. Thus in the above remarks about grooming we have noticed also the treatment of the forage.

Besides sugar, salt, *gur* (molasses), and powdered grains or peas, called *saktu*, the varieties of horses' food are indicated in the following lines:

(1) The horse should be given peas or grains, mâsa, mungo (*phaseolus mungo*), both dry and wet, as well as well-cooked meat.[3]

(2) Wines and juices of forest or wild animals take away all the defects of horses.[4]

(3) The horse should be made to take milk, ghee, water and powdered grains.[5]

Sukrâcháryya thus recommends mineral, vegetable as well as animal food. The following order[6] indicates the varying degrees of nutritive rations known to our author:

(1) Best food—*e.g.*, Barley and pea.
(2) Second class—*e.g.*, Mâsa and makustha.
(3) Inferior stuff—*e.g.*, Masur and mungo.

The *Arthasâstra*[7] of Kautilya has given more elaborate rules about rations to be observed by the superintendent of horses. In the dietary for the best horse we find curd, milk, meat, among other articles.

The importance of sugar in the rations of horses is thus indicated by Hayes:[8] Cane sugar is the best of all restoratives for animals in a state of

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[1] Sukra IV, vii, 283-4.

[2] *Horses and Stables*, p. 70.

[3] Sukra IV, vii, 272-73.

[4] Sukra IV, vii, 281.

[5] Sukra IV, vii, 282.

[6] Sukra IV, vii. 230.

[7] See Law's *Hind. Pol.* pp. 40-42.

[8] *Training and Horse Management in India*, p. 25.

exhaustion, because it can be absorbed into the system with little or no preliminary preparation by the digestive juices. Also the more tired a horse is, the more torpid are his disgestive organs. Therefore a solution of sugar is a far better restorative to a fatigued horse, supposing that the amount of sugar is equal to that of the starch in the gruel."

This explains the two rules of Sukrâchâryya about the kind of food to be administered to horses just after work. To appreciate the physiological significance of the rations prescribed in *Sukraniti*, Hayes' chapters on varieties of food, sketch of the theory of food and nutrition, watering horses, and practical rules for feeding and watering horses, should be read along with this section.

(*h*) *Rules about exercise.*

"As air is to the lungs or food to the stomach, so is exercise to the due development of the muscles, tendons, ligaments, and respiratory organs. In the horse, on account of the active exertions which we require from him, we wish to get the muscles as firm, the tendons and ligaments as strong, and the respiratory organs as vigorous as possible. * * * In the ox and sheep, and other animals which are used for food, we wish to have the flesh less firm and more tender ; and therefore we give him little or no exercise."

The above extract from Fitzwygram's work on Horses and Stables furnishes the theoretical considerations guiding the exercises of horses. It is evident that exercises would vary with the climate and seasons of lands. The rules of Sukra authors abcut the exercise of horses[1] according to seasons are given below :

(1) One should ride the horse in the morning and evening in *hemanta* (October and November), winter and spring, in the evening in summer, and in the morning in autumn.

(2) One should not use the horse in the rainy season nor on uneven grounds.

We have in the section on horticulture noticed the rules for watering plants adapted to the seasons, and had reasons for guessing that the rules indicated the conditions of life obtaining in Eastern India. In the present instance, also, the specially noticeable feature is the importance given to the rainy season, and this, again, probably points to the abundant rainfall in Eastern India.

The beneficial effects of exercise are thus described by Sukrâchâryya: "The appetite, strength, prowess, and health of the horse are promoted by well-regulated movements."[2]

The following are the rules for 'breaking' the horse :

(1) A circular breaking or training ground[3] has to be prepared. The circumference may be (i) 1,000 *châpas* or *dhanuṣ* (=4,000 cubits), (ii) 500 châpas or 2,000 cubits, (iii) 1,000 cubits, (iv) 400 cubits, or (v) 200 cubits.

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[1] Sukra. IV, vii, 266-68. In *Aswavaidyaka* a whole chapter has been devoted to the treatment of seasons.

[2] Sukra IV, vii, 269.

[3] Sukra IV, vii, 261-63.

(2) The movement or speed of the horse should be daily increased by exercises[1] within the circular ring in such a way that it can run 100 yojanas (400 or about 700 miles) in a day. This speed has been taken to be the criterion of the best horse in the calculation of prices[1] also. As for the daily increase of speed we have already noticed the theories of Sukra and Hayes.

(3) The ideal speed of horses is, again, indicated in the following rule, which, however, does not tally with the above :

"The good horse[2] should go 100 *dhanus* or 400 cubits in 16 mâtrâs." Horses are inferior according as the speed is lower." [As 10 mâtrâs=4 seconds, the rate given here would be about 64 miles an hour.]

(*i*) *The Art of Training.*

Feeding and grooming, the two parts of the work of tending horses, form the duty of the syce or groom. Exercise and Breaking also form part of his duty. But these aspects of horse-management may be conveniently left to the trainer or *siskşaka* ; for he is responsible for the character, gait, paces, speed, &c., of the animal, which depend, to a considerable extent, on exercise, breaking, &c.

We have already noticed that "it is the good or bad qualifications of the trainer that give the horse good or bad gait ; " and we have just seen that the ideal speed which the horse should be expected to approximate is 64 miles an hour or 700—800 miles a day. The trainer must therefore be well up in the rules of horsemanship, which are given below :

(1) The good trainer is he who moves his legs below the knees, keeps his body erect, is fixed in his seat, and holds the bridle uniformly.[3]

(2) The good trainer should strike the horse at the proper place by whips mildly, and not too severely but with medium pressure.[4]

It is the proper use of the whip, in which, according to Sukrâchrâyya, consists the secrect of good horsemanship or success in jockey's art : -

(1) In the first place, one should never ride a horse without a whip,[5] and should overpower the animal by whips when necessary.

(2) In the second place, he must not use it indiscriminately or very often, or strike the horse at wrong places ; for then he adds to the defects of the animal, which last for ever.[6]

(3) The following are the rules for striking a horse :—(i) at the sides,[7] if it neighs, or if it slips, (ii) at the ear, if it shies, (iii) at the neck, if it goes astray, (iv) at the space between the arms, if angry, (v) at the belly, if absent-minded.

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[1] Sukra IV, vii, 264-65. [A yojana=4, 5, 7, or 8 miles.]

[2] Sukra IV, ii, 199.

[4] Sukra IV, vii, 248.

[3] Sukra IV, vii, 244-45.

[5] Sukra IV, vii, 246-7.

[6] Sukra IV, vii, 258.

[6] Sukra IV, vii, 255-57.

[7] Sukra IV, vii, 248-50.

Or [1] (vi) at the breast, if it be terrified, (vii) at the neck, if it neighs, (viii) at the posterior, if it slips, (ix) at the mouth, if going astray, (x) at the tail, if angry, and (xi) at the knees, if absent-minded.

The function of the trainer[2] would thus appear to consist of the following classes of work :

(1) To promote the good disposition of the horse and maintain its proper mettle by skilful management, as just described.

(2) To qualify horses as swift racers by proper exercise, &c., as described in the previous sub-section.

(3) To train their gait, *i.e.*, teach them elegant paces according to the rules of military life, sportsmanship, hunting or ordinary riding.

Some of these paces were enumerated in the section on the general physiognomical and other features of horses ; *e.g.*, like those of tigers,[3] peacocks, ducks, &c. A few remarks about the gait and movements of horses have also been made there.

According to *Arthasâstra*[4] "horses were trained not only for the ordinary work of the state, but also for the more difficult movements required in war." The paces and trots enumerated by Sukrâchâryya differ, however, from those given by Kautilya, both as to name and description.

According to Sukra authors, movements are of 11 kinds :[5]

(1) *Chakrita*—circular.
(2) *Rechita*—galloping.
(3) *Valgita*—prancing.
(4) *Dhaurita*—trotting.
(5) *Âpluta*—jumping.
(6) *Tura*—speedy.
(7) *Manda*—slow or sluggish.
(8) *Kutila*—tortuous.
(9) *Sarpaṇa*—serpentine.
(10) *Parivartana*—rolling, revolving.
(11) *Âskandita*—galloping at full speed.

Of these, the following six[6] have been characterised by Sukrâchâryya thus—

(1) *Dhârâ*—which seems to be equivalent to *tura* in the above list—is known to be that pace which is very fast, in the midst of which a horse would get puzzled if spurred with the heels.

(2) *Âskandita*—that in which the horse contracts its forelegs and runs with rapid leaps.

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[1] Sukra IV, vii, 252-54.

[2] See also Sukra II, 270-73.

[3] Sukra IV, vii, 229-31.

[4] Law's *Hindu Polity*, pp. 42-44. See the technical terms used by Kautilya

[5] Sukra II, 270-73.

[6] Sukra IV, vii, 287-98.

(3) *Rechita*—that with short leaps, but continuous.

(4) *Pluta*—that in which the horse leaps with all the four legs like the deer.

(5) *Dhauritaka*—rapid movement with uncontracted legs very useful in drawing carriages or chariots.

(6) *Valgita*—that in which the animal runs with contracted legs, neck raised like that of the peacock, and half the body trembling.

(*j*) *Stables and Trappings.*

Sukraniti is silent about stables. We read only that horses are well-kept in watered lands,[1] and that stables for horses should be built in the northern side[2] of the palace. Kautilya deals with the subject very elaborately and treats of the ventilation, sanitation,[3] accommodation of the houses to be built for the horses.

As for the trappings, we have noticed them in connexion with grooming. One of the 64 Kalâs is the preparation of saddles[4] for horses, elephants, bulls and camels.

The instrument by which the horse is to be controlled is the bridle or reins, which has been elaborately described.[5]

For cleansing purposes an instrument with seven sharp teeth[6] is used.

SECTION 14.

Elephants.

In modern India elephants are used principally and solely as draught-animals. The following extract from Lieut-Colonel G. H. Evans' *Elephants and their Diseases*[7] would give an idea of the uses to which they are put:

"Elephants may conveniently be divided into two classes, namely,—(*a*) timber-elephants, (*b*) baggage or travelling elephants.

Timber-elephants, again, may be divided into two classes, namely, (i) trained tuskers, (ii) trained males and females.

Well-trained tuskers have at all times commanded a good price ; they are much more useful, both in yards and forests, as with their tusks they can 'oung', *i.e*, butt and stack timber, carry butts and planks, assist in getting logs over obstacles or in clearing blocks in creeks. * * * Though tuskers are largely employed in dragging operations, still most of such work is generally performed by tuskless males and females. Most Burmese elephants are trained to timber-work, and to some extent to carrying baggage."

In ancient and mediæval India, however, the elephant force constituted a special and characteristic feature of the Animal-corps Alexander had to encounter on the Hydaspis a Hindu army which was remarkably strong in its elephant-force. Megasthenes' description of the capture of elephants is one of the earliest pieces of literature on the subject.[1] "One of the four well-known divisions[2] of the old Hindu army was the elephant-force * * * There has been on record many a battle in early Indian history in which elephants carried the day."

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[1] Sukra IV, vii, 349-50.

[2] Sukra I, 451-3.

[3] Law's *Hind. Pol.*, pp. 38-39.

[4] Sukra IV, iii, 194.

[5] Sukra IV, vii, 341-44.

[6] Sukra IV, vii, 346.

[7] Pp. 7-8 (published by Superintendent, Government Printing, Burma, 1910).

It is not strange, therefore, that the animal should have drawn towards it the attention of Hindu poets, scholars, Ayurvedists, artists, politicians, &c., from the earliest times. We have already noticed the vast literature on the life, habits, medical treatment, &c., of elephants It may also be noted that the elephant is very abundant in, and almost a characteristic fauna of, India. The abundance of the animal and its nearly uniform " distribution " throughout the land, account for the considerable uses made of it by kings in every part of the country and the impression made upon the thought of the people everywhere. Besides their distribution in present times along the foot of the Himâlayas as far west as Dehra Dun, forests between Gangâ and Krisṇâ, Western Ghats, Mysore, and Ceylon, "there is evidence[3] that about three centuries ago elephants wandered in the forests of Malwa and Nimar, while they survived to a later date in the Chanda district of the Central Provinces. At the comparatively remote epoch, when the Deccan was a forest tract, they were probably also met with there."

The rearing up of a good breed of elephants was recognised as one of the special cares of Chandragupta's Government. "The killing of an elephant was visited even with capital punishment."[4] Kautilya has treated the subject elaborately in *Arthasâstra*.

But Sukrâcharyya has paid more attention to horses than to elephants or the other animals in the army.

(*a*) *Mettle and worth.*

According to Hindu writers, the appreciation of elephants like that of horses depends on the following considerations :—(1) measurements of limbs, (2) certain external characteristics and internal temperament, (3) marks or omens, (4) places of origin. Sukrâchâryya has not touched the last two, and has dealt with the first two items very summarily.

The general physiognomical and other features of elephants that are much appreciated can be known from the following remarks :

(1) The best of all elephants[5] is one which has long cheeks, long eyebrows and long forehead, has the swiftest speed, and has auspicious marks on the body.

(2) Harmful elephants are those that have blue palates, blue tongues, curved tusks or no tusks, who persist long in their angry moods, whose rut gushes out without any systematic order, who shake their backs, who have less than 18 nails, and whose tails touch and sweep the ground.[6]

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[1] Book III, Fragment XXXVI.

[2] Law's *Hind. Pol.*, p. 47.

[3] *Encyclopœdia Britannica*, 11th Edition, Vol. 9, p. 260.

[4] Law's *Hind. Pol.*

[5] Sukra IV, vii, 83-84.

[6] Sukra IV, vii, 64-67.

A modern writer[1] on the subject enumerates the following points of a good elephant which may be compared with those given by the ancient Hindu author: medium height, a good big barrel, skin soft and wrinkled (described by Burmans as crocodile skin), the head massive, full cheeks, and a broad forehead; the ears large, eyes bright and kindly, and free from opacity or excessive flow of tears; the trunk of good length, broad at the root, and blotched in front with pinkish coloured spots. The neck short, thick and full; chest broad, the back straight and broad, broad loins; short forelegs, convex in front (*i.e.*, set up like a lion). The hind quarters full, sloping well down and supported by thick short limbs. The pads of the feet hard, nails smooth and polished, action free, paces fast and easy; the tail should be of good length, free from hardness, and provided with a good tuft of bristles."

The tests of Varâhamihira of the 6th century A. D. are given in the following lines taken from the 67th chapter of *Brihat Saṃhitâ*,[2] called 'characteristics or features of elephants':

(1) "The elephant whose lips and mouth are red, whose eyes resemble those of the sparrow, whose tusks are shining, grow upwards and have sharp ends, whose face is large and long, whose backbones are like bows, long and invisible, whose *mastakas* (round protuberances on the temples) are covered with hair and resemble the turtle, whose ears, mouth corners, navel, forehead, and genital organs are large, whose body resembles the turtle, whose nails are 18 or 20, whose trunk has three lines and is round, whose tail is beautiful, and whose juice (when in rut) is felt to be of good smell when the animal blows through its trunk, will bring on wealth.

(2) The elephant whose tail is long, trunk red, roar like that of clouds, and neck large, long and round, will bring wealth to a king.

(3) Non-rutting elephants, those which possess extra or defective organs, those which are lame or short, or whose tusks resemble the horns of the sheep, whose testicles are visible, those which possess little or no trunk, whose mouth corners are brown, blue, black, or of different colours, those which possess very little hair about the face, those which have no tusks, those which have no virility, female elephants possessing the features of a male elephant produce misery."

These and sundry topics of economic importance in connection with elephants have been dealt at length in the 36th chapter of Book IV of Sivadatta's *Pâlakâpya.*

Hindu tradition, as we have just seen, attaches much importance to the number of nails. The following remarks of Evans throw much light on this question: "Some animals have four nails on each foot; this decreases their value, as five nails on each foot raises the same; four on each of the front feet and five on the hind ones does not interfere with their value. Out of a total of

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[1] Evans: *Elephants and their Diseases*, pp. 8-10.

[2] Iyer's *Brihat Saṃhitâ*, Part II pp. 98-99.

62 ; *Indian, Burmese, and Siamese elephants, only three possessed twenty* nails[1] $\frac{5-5}{5-5}$, 500 had eighteen $\frac{5-5}{4-4}$, 104 sixteen $\frac{4-4}{4-4}$, and 16 seventeen toes $\frac{5-4}{4-4}$."

It would appear, therefore, that the very fact of 18 and 20 nails being rare has had something to do with the worth of animals among the Hindus. We incidentally notice here the minute observation of limbs and other features of animals that was a characteristic of Hindu intellect.

(*b*) *Omens.*

The auspicious marks have been referred to in *Sukraniti*, but have not been described. The *Brihat Saṃhitâ* has enumerated some of the omens connected with elephants which may be interpreted to indicate prosperity or adversity of the owners. A few remarks apply equally to horses and elephants. Certain special points applying only to the latter, *e.g.*, those connected with the cutting, breaking, etc., of the tusks are being given below :[2]

"(1) If the cut be white, smooth, glossy and emitting good scent, there will be prosperity. All that I now proceed to state about the breaking of tusks applies also to the dropping down, becoming thin and loss of colour.

(2) "If the elephant be found to walk unsteadily, if its ears cease to move, on a sudden, if the animal be of dejected appearances or if it be found to put its trunk to the ground or to breathe softly and long, if the eyes be full of tears, if the animal be found to sleep always or to be restive or to refuse to eat properly, or to pass excrement or urine often, there will be misery."

Burmese tradition on the subject has been recorded by Evans in *Elephants and their Diseases.*[3] "The following peculiarities in some animals reduce their value, as they are regarded with superstitious dread by the Burmese. It is thought that the ownership of such creatures may cost their masters loss of life or substance:

(1) A loose fold of skin, descending from the throat down to the forelegs."
(2) Moving head up and down and simultaneously from left to right.
(3) Swinging the trunk only to the left and right.
(4) Restlessness of the whole body somewhat after the fashion of bears.
(5) Holding the trunk up in the air and putting it into the mouth."

(*c*) *Breeds.*

The *Hastisâstras* have handed down various systems of taxonomy, both economic and more or less zoological. In *Sukraniti* we have only one system of terminology and classification. "There are four classes[4] of elephants in order of merit :

(1) *Bhadra*—(*a*) "that which has tusks coloured like honey (*i.e.*, not

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[1] *Elephants and their Diseases*, p. 12.

[2] Iyer's *Brihat Saṃhitâ* Part II. pp. 212-13.

[3] Pp. 11-12.

[4] Sukra IV, vii, 68.

pure white, but yellowish, which is strong and well-formed, is round and fat in body, has good face and excellent limbs ; "[1] (*b*) " the height[2] or stature is seven cubits, length eight cubits, and girth or circumference of the belly ten cubits."

(2) *Mandra*—(*a*) " that which has a fat belly,[3] lion-like eyes, thick skin, thick throat and thick trunk, medium limbs, and a long body ;" (*b*) height[4] six cubits, length eight and girth nine.

(3) *Mriga*—(*a*) " that which has small or short throat,[5] tusks, ears and trunk, big eyes, and very short lips and genital organ, and is dwarf ; " (*b*) height five cubits,[6] length seven cubits and girth eight cubits.

(4) *Misra*—(*a*) " that which has these[7] characteristics in mixture,"—*i.e.*, a non-descript, incapable of being specified as belonging to a particular type, (*b*) no measurements given.[8]

It would appear that the 'artificial' classification given here is meant only to indicate by technical terms the permutation and combination of external characteristics previously mentioned.

Varâhamihira also recognises these four classes of elephants in Chapter LXVII, but describes them in a slightly different[9] manner. The second class is called by him *manda* and not *mandra*, and the last *sankirṇa* and not *miśra*. The measurements given by him agree with those in *Sukraniti* except in the following rule recorded by the latter :—" But it is mentioned[10] by sages that the lengths of the mandra and bhadra class would be equal." The additional information in *Brihat Saṃhitâ* is about colour of the animals :—

(1) The *Bhadra* is of green colour and is a rutting animal.
(2) The *Mandra* is of yellow colour.
(3) The *Mriga* is of black colour and is also a rutting animal.
(4) The *Sankirṇa* is of mixed colour and a rutting animal.

About the height of elephants[11] Evans makes the following remarks :—

" Extravagant estimates of the height of elephants have from time to time been recorded ; their great bulk so far exceeds that of the ordinary animals we are accustomed to see that the tendency is to overestimate their size. The old method of measuring was also most misleading : a rope was simply thrown over the back, the ends brought to the ground on each side, and half the length taken as the height. Much amusing information on this subject is contained in Sanderson's excellent work. Madras elephants, he tells us, were at one time said to be from 17 to 20 ft. high, and an animal of Dacca was said to be 14 ft. Mr. Corse, a gentleman thoroughly conversant with elephants * * * was rather surprised to find that according to his measurement the animal said to measure 14 ft. did not exceed 10 ft. in height (a very good height). We may take it on the authority of Sanderson * * * that such a thing as an elephant measuring 10 ft. at the shoulder does not exist in India, nor may I add, in Burma. The largest male he ever met with measured 9 ft. 10 in. and the tallest female 8 ft. 5 in. * * * Of 300 elephants measured in this Province the average height was 7 ft. 10½ in. * * All these animals were measured at the shoulder as is done with horses."

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[1] Sukra IV, vii, 69-70.

[2] Sukra IV, vii, 79-80. [*N.B.*—In elephant measurements, 8 yavas=1 angula.
24 angulas=1 kara or cubit.
In horse-measure, 5 yavas=1 angula.
Sukra IV, vii, 77-8, 85.]

[3] Sukra IV, vii, 71-72.

[4] Sukra IV, vii, 81-82.

[5] Sukra IV, vii, 73-74.

[6] Sukra IV, vii, 81-82.

[7] Sukra IV, vii, 75.

[8] Sukra IV, vii, 76.

[9] See the original Sanskrit Text in the *Bibliotheca Indica Series*, edited by Kern (Calcutta, 1865), pp. 338-40

[10] Sukra IV, vii, 82

[11] *Elephants and their Diseases*, pp. 4-5

It is evident from the above that the Indian method of measuring heights is different from that of measuring animals at the shoulder. Therefore, the extraordinary height attributed to Indian elephants by people as well as scholars of Hindusthan, is quite natural and perfectly explicable, and in fact does very well tally with the statistics recorded in modern times. According to the Hindu authorities the *bhadra* or the best class attains a height of 7 cubits or 10½ ft., and the *mriga* or ordinary class has a stature of 5 cubits or 7½ ft., and this, measured not by the new method, but the old Indian method. If the heights of the old method be reduced to the new standard, the Bhadra would be very much under 10½ ft. *i.e.*, about 8 or 9 ft.; and the Mriga would be about 5 or 6 ft. We should therefore be inclined rather to think that the Hindu writers have understated the highest stature attainable by elephants; for, as we have just seen, the Dacca elephant measured 10 ft., and the average elephants measure generally 7 ft. 10½ in.; *i.e.*, the ordinary animals are equal to the highest classes mentioned in the standard Sanskrit works on elephants.

Abul Fazl records the Hindu tradition of the four classes of elephants in the *Ayeen Akbari*,[1]—that Imperial Gazetteer of India in Moghul times:

"The natives of Hindusthan hold this animal in such estimation that they consider one of them as equivalent to 500 horses. * * * The price of an elephant is one hundred to a lac of rupees. Those of five thousand, and of ten thousand rupees price, are not uncommon. * * *

There are four kinds of elephants. *Behder* (Bhadra) is that which has well-proportioned limbs, an erect head, broad breast, large eyes, and a long tail, with two excrescences in the forehead resembling large pearls. These excrescences are called in the Hindovee language Guj Manik, and many properties are ascribed to them. Another kind called *Mund* (Mandra) has a black skin, and yellow eyes; is bold and ungovernable. That called *Murg* (Mriga) has a whiter skin, with moles, and its eyes are of a mixture of red, yellow, black and white. That called *Mirh* (Misra) has a small head, and is easily brought under command: Its colour is a mixture of white and black, resembling smoke. And from mixtures of the above kinds are formed others of different names and properties."

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[1] Part I pp. 146-147 (Translation published in 1783).

It should be remarked that Kautilya's *Arthasâstra* does not enumerate these four classes ; his silence may probably be taken to mean the absence of the idea in the 4th century B. C. But the *Yukti-kalpataru*, also, a work later than *Brihat Samhitâ*, which treats of elephants, horses, cattle, &c , and mentions the eight classes of elephants called *Diggaja*, *e.g.*, *Airâvata*,[1] *Pundarika*, &c., with their characteristics as well as the four classes, *e.g.*, Brahmana, Kṣatriya, &c., does not record the four-fold distinction noted in Sukranîti and Brihat Samhitâ. So the mere silence of Kautilya is no evidence against the absence of the tradition in his times.

The number four seems to have been a favourite with Hindu authors in thinking of classes. For corresponding to the four castes in social life we have four classes of elephants and also four classes of wood. Thus "according to the *Brikṣa Ayurveda*[2] or the Science of Plant-Life (Botany) four different kinds of wood are to be distinguished : the first or the *Brahmana* comprises wood that is light and soft and can be easily joined to any other kind of wood ; the second or the *Kṣatriya* class of wood is light and hard, but cannot be joined on to other classes ; the wood that is soft and heavy belongs to the third or *Vaisya* class ; while the fourth or the *Sudra* class of wood is characterised by both hardness and heaviness."

The classification of breeds according to the places of origin has not been mentioned in *Sukranîti*, but recorded by Kautilya : "The sources of supply of elephants[3] were the following places : (1) Kalinga, (2) Anga, (3) Karusa (eastern portion of the district of Shahabad in Behar) supplying elephants of the best quality ;

(4) Prâchya (east), (5) Dasarṇa (modern Mandasore), (6) Aparanta (western countries, *viz.*, Konkan and Malabar), supplying elephants of medium quality ;

(7) Surâstra (Guzrat) and (8) Panchajana (in Northern India), supplying elephants of inferior quality."

The following extract from the *Ayeen Akbari* would also furnish information regarding some aspects of the Economic or Commercial Geography of Mediæval India : "Elephants are taken in the following places. In Agra, in the wilds of Begavan, and Nerwar, as far as Berar. In the Subah of Allahabad ; near Ruttenpoor ; Sirgetchch ; the Subah of Malwa ; Hattendeyah ; Achowd : Chundary ; Suntwass ; Bijegurh ; Roysan ; Hosengabad ; Gurh ; Haryegurh ; in the Subah of Behar on the Borders of Rohtas ; at Jharkhend ; and in the Subahs of Bengal and Orissa, particularly at Satgong, there are great numbers. The best elephants are those of Tipperah."

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[1] Two of these eight names have been referred to in Sukra II. 256–58

[2] *History of Indian Shipping* (Longmans, Green & Co.). 1912 by Prof. Radhakumud Mookerji, p. 20.

[3] Law's *Hindu Pol.* pp. 50–51.

The money-value of elephants, according to the statistics supplied by the Sukra authors, is indicated below :

(1) Good elephant[1] (or horse) costs 2,000, 3,000, or 4,000 rupees.

(2) The elephant[2] that is unrivalled in strength, height, fight and *mada* (rut) is priced at 2000 *niṣkas* [Niṣka is the value of gold weighing 4 *mâṣâs*: and in estimating the value of elephants, 5 *ratis*=1 *mâṣâ*] or Rs. 6,666.

We have already noticed the remarks of Abul Fazl about the high prices of these animals. Evans' remarks on Prices are given below: "Prices vary according to age, good points, temper, training, and length, thickness, and sweep of the ivory. * * * A full-grown well-trained tusker will command as much as Rs. 7,000 and a well-trained female as much as Rs. 5,000. Elephants that are trained to baggage work or slightly to timber may cost Rs. 4,000." These are known to be high prices.

(*d*) *Training and Management.*

Information in Sukranîti regarding the rations, grooming, exercise, training, medical treatment, stabling, &c., of elephants is very scanty, almost nothing. Some of these items have been but casually noticed, as we have seen previously. Thus we read: (1) One should bring friends and foes to submission by appropriate methods as snakes, elephants and lions are tamed.[3] (2) The elephant, the horse, the bull, the child, the wife and the parrot get the qualities of their teachers through association.[4]

The art of training has been mentioned among the subjects that should be studied by the man who is to be in charge of elephants.[5] We have also read previously of professions connected with the capture of the animals. There are two *kalâs*[6]—one relates to the driving or guiding, and the other to the teaching or training.

The *Arthasâstra*[7] gives more details. About capture of the animals we are told that the captors, taking with them five or seven female elephants roamed about in the summer—the season for the capture of elephants—in the forest, and traced the whereabouts of herds of elephants by folllowing the course of their dung and urine, and by observing their footmarks, the spots where they reposed, the banks of rivers, lakes, &c., they damaged.

Kautilya divides elephants into four classes according to their training:

(1) *Damya*—those that are being trained.

(2) *Upavâhya*—those trained for riding, &c., in times of peace.

(3) *Sânnahya*—trained for war.

(4) *Vyâla*—refractory and difficult to be broken, because of obstinacy, perversity, bad temper, &c.

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[1] Sukra IV, ii, 198.

[2] Sukra IV, ii, 203-6.

[3] Sukra IV, i, 48-49.

[4] Sukra III, 582-3.

[5] Sukra II, 256-9.

[6] Sukra IV, iii, 166.

[7] Law's *Hind. Pol.* p. 51-7.

There were several clearly marked out stages in the process of taming. For war purposes the elephants were taught seven kinds of movements ; for riding they were taught eight movements. The movements for military purposes are :—

(1) *Upasthâna*—rising, bending, jumping over fences &c.
(2) *Samvartana*—turning.
(3) *Samyâna*—moving forward straight or transverse or making serpentine movement.
(4) *Vadhavadha*—killing and trampling down.
(5) *Nâgarayana*—assailing forts and cities.
(6) *Hastiyuddha*—fighting with other elephants.
(7) *Sângrâmika*—other cognate movements relating to war.

The elephant is governed by the hook[1] which has two teeth, one for movement forward, and the other for movement backward.

About stables Sukrâchâryya says nothing. We are only told that elephants are well-kept in forests.[2] The sixth chapter of the 4th Book of ***Pâlakâpya*** describes in prose the nature of the soil, the direction, the size, shape, doors, &c of the stables suitable for elephants : and the 5th chapter of the second Book advises great precaution in allowing visitors into the ***hastisâlâs*** for fear they might cause damages to the animals by administering poisons, &c. The effects of poisons on various substances, animals, milk, fire, &c., are treated here quite elaborately. In connexion with the housing arrangements should be noted also the religious ceremonies for the propitiation of the gods described in the last two chapters of the Book IV.

Kautilya's treatment of stables[3] in the Arthasâstra is full enough. "There were two sets of stables, one in the fort, and the other outside ; in the former were kept those animals that had already been trained for war and riding, and in the latter those that were being trained, together with the refractory animals.

An elephant stable was twice as high as the length of an elephant, and its width was half its height : it was made to face either the north or east, had separate apartments for female elephants, had a spacious corridor, &c."

SECTION 15.

Bulls and Camels in Sukraniti.

The celebrated Sanskrit manuscript, called *Yukti-kalpataru*, has several sections devoted to animal-life. Three of these relate to Bulls and Cows, their character, merits and defects. There are two methods of classification adopted in this treatise with regard to Bulls : (1) into Brahmanas, Kṣatriyas, Vaisyas and Sudras, and (2) into Sâtwika, Râjasika and Tâmasika.

Information supplied by Sukra authors is very meagre. We read—

(1) Bulls get the qualities of their trainer through association.[4]

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[1] **Sukra IV, vii, 339-40.**
[2] **Sukra IV, vii, 349-50.**
[3] **Law's *Hindu Pol.* p. 51.**
[4] **Sukra III, 582-3.**

(2) The price of a bull[1] with good horns, fair colour, sufficient strength, which can carry burdens and can walk fast, and which has the height of eight tâlas is Rs. 480.

(3) The bull is controlled by the string which passes through the nose.[2]

(4) Bulls are well-kept in watered lands.[3]

Regarding camels we are told—

(1) The high price of camels is known to be that of the buffalo,[4] *i.e.*, Rs. 56 or Rs. 64.

(2) The good camel[5] is one which can go 30 yojanas (120 or 210, or 240 miles in one day. Its price is 100 silver palas or Rs. 800

(3) The camel, like the bull, is governed by the strings.[6]

(4) Camels, like elephants, are well-kept in forests.[7]

The following are the remarks of Abul Fazl about camels :

"From the encouragement given by His Majesty, there are now bred in Hindusthan camels that excel those of Turan and Iran.

"A number of these animals are selected, and always kept ready to fight for diversion. The head *Khaseh* camel, named *Shah Pussend* (the king's choice), and who is a native of Hindusthan, has for the space of 12 years conquered all antagonists.

"Camels are bred in the following places : Ajmere, Judhpoor, Nagore, Beyganur, Jalmeer, Hetinda and Tahresir ; and in the Subah of Gujrat, near the province of Kutch are great numbers and very fine. But in Sind are the greatest abundance. The swiftest camels are those of Ajmere, the best for burden are bred in Tatah" * * * Camels do not live above 24 years."

The *Ayeen Akbari* gives details about the daily rations of camels according to age, their furniture, methods of training and anointing them, the administrative staff in connexion with this branch of Imperial live-stock, and prices, etc.

The Hindus had been for ages skilled in the training and management of camels. And it appears that the camel-post was one of the Moghul institutions for the conveyance and transmission of news : 'Reybary is the name given to a tribe of Hindus, who are skilled in the management of camels. They teach the Hindu Look (species of camel) to travel at a great rate. Although for the speedy conveyance of intelligences postmen are stationed at every five *cose* (10 miles) from one extremity of the empire to the other, yet a great number of these camel riders are continually in waiting at the palace to carry order."

About Bulls the *Ayeen Akbari* gives the following information: "Throughout Hindusthan the ox is esteemed lucky and held in great veneration. Every part of the empire produces good oxen, but those of Gujrat are esteemed the best. These will travel 36 miles in the course of 24 hours, and they are swifter than the generality of horses. Sometimes a pair of them are sold for 100 mohurs, but they are very commonly of 10 and 20 mohurs. There are also abundance of fine oxen in Bengal and the Deccan, that will kneel down to be loaded. Many cows at Delhi give daily 20 quarts of milk each, and are sold for more than 10 rupees. His Majesty has a pair of bullocks which cost 500 rupees. In the neighbourhood of Tibet and Kashmeer, are the Katars, which are of a very extraordinary appearance. This animal lives seldom above 25 years.

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[1] Sukra IV, ii, 194-195.

[2] Sukra IV, vii, 345.

[3] Sukra IV, vii, 349-50.

[4] Sukra IV, ii, 198.

[5] Sukra IV, ii, 201-2.

[6] Sukra IV, vii, 345.

[7] Sukra IV, vii, 349-50.

SECTION 16.

The Anatomy of the Vertebrates.

(*a*) Hindu Literature on Human Anatomy.

Like mineralogy, Botany, and Zoology, the Anatomy of the Hindus lies scattered through all branches of Hindu literature, Vedic, Paurâṇic, Tântric, Medicinal, Astronomical, and Sociological.

The Hindus have described five hundred muscles,—four hundred in the extremities, sixty-six in the trunk, and thirty-four in the region above the clavicle. They knew of the ligaments, sutures, various vessels and nerves, lymphatics and nerve plexuses, seven layers of skin, Mânasadharâ or Fascia, Medhadharâ or Adipose tissue, Raktadharâ or Vascular tissue of blood vessels, Pittadharâ or Mucous membrane of the digestive canal, Sleṣmadharâ or Synovial membranes, etc. There are allusions to Vapâ (pericardium), Hridaya (heart), Fusfusa (lungs) Yakrit (liver). Pliha (spleen), Vrikka (kidneys), Mastiskam (brain), Adhipati (medulla),[1] etc.

Any tubular structure is called by them a *nâdi* or vessel. But they distinguish three sorts of *nâdis*: (1) Dhamani (artery) carrying wind, (2) Sirâ (vein) carrying blood, (3) Srota (canal), including the large and small intestines, ducts of the various glands, lacteal vessels, etc.

1. *The Nervous System of the Tantras.*

The contributions of the Hindus to anatomy are recorded in many non-medical works,—*e.g.*, the Tantras—the last phase of Yoga philosophy in India—the records of Hindu culture in mediæval times. It is only very recently that the Tantras have begun to be edited and translated.[2] But in 1885 one of these documents of Hindu allegorical literature and mystical lore, *viz.*, the *Shiva Saṃhitâ*, was translated into English by Rai Bahadur Srischandra Basu.

In his Prize Essay on the Hindu System of Medicine published in the *Guy's Hospital Gazette* of London (1889), Major B. D. Basu, I.M.S., referred to the anatomy of the Tantras in the following words: "When these Tantras

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[1] The Ayurvedic System of Medicine by Dr. Sumant B. Mehta of Baroda (Navsari, Bombay, 1913), and Dr. Gananath Sen's Medical Science in Ancient India (Sâhitya Sabhâ, Calcutta, 1908).

[2] See the *Tantrik Texts Series*, edited by Avalon, and *Mahânirvâṇa Tantra* translated previously by Manmathanath Datta, recently revised by Avalon (Luzac & Co., London, 1913.)

will be studied by oriental scholars, as closely as they have explored other branches of Sanskrit learning, the anatomical knowledge of the ancient Hindus shall be better known to the world ; " for, according to him, " better anatomy is given in the Tantras than in the medical works of the Hindus."

From *Shiva Saṃhitâ* now republished in the "Sacred Books of the Hindus Series," we learn that the Hindus were acquainted with the spinal-cord and the brain. They knew that the central nervous system is composed of grey and white matters. They discovered the central canal of the spinal cord, and traced its connexion, through the fourth and third ventricles, with the lateral ventricles of the brain. They call it *Brahmarandhra*, or the dwelling-house of the human soul. The same Tantric work gives a description of the several ganglia and plexuses of the nervous system. The brain is said to be composed of *Chandrakalâ*, or convolutions resembling half-moons.

The nervous system of man is in fact more accurately described in the mystical Tantras than in purely medical treatises. In a paper on the Anatomy of the Tantras, originally published in the "Theosophist" of March 1888, and reprinted in the Introduction to Shiva Saṃhitâ in the Sacred Books of the Hindus Series, Major Basu has tried to unravel the mystery of the Yogis and Tântrists regarding the nerves and nerve-centres, and identify the *Nâdis*, *Chakras*, and *Padmas*. The following is a reproduction from that paper.

The language of the Tantras being too allegorical and too mystical to be understood by the uninitiated, it is very difficult to identify the Nâdis, the Chakras, and the Padmas described in them.

However, some of the spots are easily identifiable from their simple and lucid description. Thus it is apparent that the "nectar-rayed moon" (*vide* Shiva Saṃhitâ, Ch. II, verse 6) is the underpart of the brain ; that "Suṣumna" is the spinal cord ; "Idâ" and "Pingalâ" are the left and right sympathetic cords respectively.[1]

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[1] The Uttar Gîtâ has thus described the relations of these structures (Ch. II, verses 14 and 15) :—

"The bony column that extends (from the coccyx) to the occiput is called the Brahmadanda (*i.e.*, the vertebral column). Within this is the thin cord Suṣumnâ, which is also called Brahmanâdî by the wise. This Suṣumnâ is midway between the Idâ and Pingalâ."[5]

Another Tantric work named, Ṣat-Chakra Nirûpaṇam, has thus described the position of these three Nâdîs :

"Outside the spinal canal, on the left is the Idâ and on the right is the Pingalâ, while within the canal and midway between the above two Nâdîs is the Suṣumnâ, whose structure is like a rope."

Prof. Cowell identifies Suṣumnâ with the coronal artery (*vide* his translation of Maiteyi-opinishad, p. 270, footnote. Published by the Asiatic Society of Bengal.) While Pandit Rama Prasad Kasyapa, M. A., identifies Suṣumna with trachea, and Idâ and Pingalâ with left and right bronchi (Occult Science, the Science of Breath. Published at Lahore, 1884).

But it is clear from the above description that these three famous Nâdîs are the spinal cord and the two sympathetic cords, We shall try now to identify some of the nervous structures described in the Tantras :—

"Chitra."—From the description of this Nâdî in the Tantras (Shiva Saṃhitâ, Ch. II, verses 18-19), it may be identified with the grey matter of the spinal cord. For "in it is the subtlest" of all hollows called "Brahmarandhra," which is nothing else save the central canal of the spinal cord—a structure whose functions remain as yet to be discovered by the physiologists. The Tantrists appear to have traced its connection with the lateral ventricles of the brain. It has been considered by them to be the seat of the human soul. Even in these days, when it is no exaggeration to say that the Hindus have quite forgotten the scientific truths discovered by their ancestors, they point to the hollow space in the crown of the head (known as the anterior fontanalle) of the new-born child as the Brahmarandhra.

Every tyro in anatomy knows that this space contains the lateral ventricles of the brain.[1]

The "Sacred Triveṇî" (Shiva Saṃhitâ, Ch. V, p. 52) is the spot in the medulla oblongata where the sympathetic cords join together or whence they take their origin. (*Vide* Ashby's Notes on Physiology,—Article Medulla Oblongata). The mystic Mount Kailâsa (Shiva Saṃhitâ, Ch. V, p. 154) is certainly the brain.

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[1] Prof. Sir Monier Williams has defined Brahmarandhra to be "a suture or aperture in the crown of the head and through which the soul is said to escape on death." (Sanskrit-English Dictionary.) Now the learned professor's definition explains nothing. Had he consulted the Tantras and known the space called the Brahmarandhra by the modern Hindus, we doubt not his conclusion would have been the same as ours (*i.e.*, he would have identified the Brahmarandhra with the central canal).

2. A Hindu renegade thus delivered his verdict on the anatomy of the Tantras, &c. :

"It would indeed excite the surprise of our readers to hear that the Hindus, who would not even touch a dead body, much less dissect it, should possess any anatomical knowledge at all............................ It is the Tantras that furnish us with some extraordinary pieces of information, concerning the human body........... But of all the Hindu Sâstras extant, the Tantras lie in the greatest obscurity...The Tantric theory on which the well-known Yoga called "Shat-chakra-bheda" is founded, supposes the existence of six main internal organs, called Chakras or Padmas, all bearing a special resemblance to that famous flower, the lotus. These are placed one above the other, and connected by three imaginary chains, the emblems of the Ganges, the Yamunâ and the Saraswati............

"Such is the obstinacy with which the Hindus adhere to these erroneous notions, that even when we show them by actual dissection the non-existence of the imaginary Chakras in the human body, they will rather have recourse to excuses revolting to common sense, than acknowledge the evidence of their own eyes. They say with a shamelessness unparalleled, that these Padmas exist as long as a man lives, but disappear the moment he dies."—*Physical Errors of Hinduism*, Calcutta Review, Vol. XI, pp. 436-440.

A Daniel has come to Judgment. Did the Hindu renegado take the trouble to compare the Chakras with the Plexuses of modern Anatomy ? Had he done so, he would not have talked such nonsense. His paper contains two diagrams, one of the six Chakras and the other of the different viscera as represented by the modern Tântrists.

Padmas and Chakras. – Great difficulty arises in identifying these Padmas and Chakras. What are these structures one is tempted to ask? Are they real, or do they only exist in the imagination of the Tântrists? Though we are unable to satisfactorily identify them, we nevertheless believe that the Tântrists obtained their knowledge about them by dissection. These terms have been indefinitely used to designate two different nervous structures, *viz.* :— nervous plexuses and ganglia. But it may be questioned, how are we authorized to identify the Tantric Padmas and Chakras with either the ganglia or plexuses of the modern anatomists? Our reasons for doing so are the following:

1st.—The position of some of these Padmas and Chakras corresponds with that of the plexus or ganglion of the modern anatomists.

2nd.—These Chakras are said to be composed of petals designated by certain letters, which clearly point to either the nerves that go to form a ganglion or plexus, or the nerves distributed from such ganglion or plexus.

3rd.—Certain forces are said to be concentrated in these Chakras, thus identifying them with the plexuses or ganglia which the modern physiologists have proved to be "separate and independent nervous centres."[1]

This Nâdi Suṣumnâ has six Padmas (Shiva Saṃhitâ, Ch. II, v, 27, p. 12), evidently signifying the six nervous plexuses formed by the spinal cord.

The description of the thousand-petalled lotus (Shiva Saṃhitâ, p. 51) shows it to be the medulla oblongata.

We proceed next to the identification of the famous six Chakras of the Tantras :—

i. *Mulâdhâra Chakra* (Shiva Saṃhitâ, p. 44) is the sacral plexus.

ii. *Swadhisthâna Chakra* (Shiva Saṃhitâ, p. 46). There can hardly be two opinions as to its being the prostatic plexus of the modern anatomists.

iii. *Manipur Chakra* (Shiva Saṃhitâ, p. 47) appears to be the epigastric plexus.

iv. *Anahat Chakra* (Shiva Saṃhitâ, p. 47) is the cardiac plexus.

v. *Viṣudha Chakra* (Shiv Saṃhitâ, p. 48) is either the laryngeal or pharyngeal plexus.

vi. *Ajnâ Chakra* (Shiva Saṃhitâ, p. 47) is the cavernous plexus.

We have very briefly hastened over the six Tantric Chakras. We see that these Chakras are the vital and important sympathetic plexuses, and preside over all the functions of organic life.

There can be little doubt that by the "contemplation" on these Chakras, one obtains psychic powers.

"Contemplation" leads to control over the functions of these Chakras or plexuses. "The intimate connection between the sympathetic nerves and the

[1] **Gray's Anatomy, 10th Edition.**

great viscera renders it highly probable that the sympathetic system has mainly to do with the organic functions. * * * The sympathetic is the system of organic life." When one gets control over the sympathetic nervous system, one is the master of one's body, one can die at will. The heart beats at his will. The lungs, the intestines, nay, all the different viscera of the body, carry on their allotted duties at the command of such a Yogi. Verily, verily, that is the stage of Samâdhi.

The learned translator has treated only of the five externalities of Yoga in his elaborate introduction. He has not dwelt on the Dhyâna, Dhâraṇâ and Samâdhi. As "Pratyahâra is not a distinct method in itself, but is a result of Prâṇâyâma," so Samâdhi is the stage brought about by the processes of Dhyâna and Dhâraṇâ. As "by Pratyahâra, the subjective world overcomes the objective," so by Samâdhi, the spiritual nature of man stands predominant over the gross physical one. Pratyahâra must be clearly distinguished from Samâdhi. No more serious mistakes, we think, can be committed than considering the hybernation of the reptiles and other animals as illustrating the Samâdhi stage of the Yogis. The hybernation corresponds with the Pratyahâra, and not the Samâdhi stage of Yoga. The learned translator has happily compared the Pratyahâra stage with the stage of insensibility produced by the administration of anæstheties, *e.g.*, chloroform (Introduction to the Shiva Saṃhitâ, Ch. X, pp. lvii, *et seq*). But it is a well-known fact that the inhalation of chloroform has little perceptible effect upon the sympathetic nerves. The spiritual conciousness of man is intensified only when the functions of the organic life are brought under his control, and when he can modify and regulate the functions of the different viscera. We repeat that that is the stage of Samâdhi.

It behoves all students of Yoga and occultism then to gain a clear knowledge of these six Chakras, from the contemplation of which he can aspire to attain to the stage of Samâdhi.

Major Basu concludes thus :

"This is an humble attempt on our part to identify these Chakras, and how far we have succeeded in our task, it remains for those who are abler, and more learned than ourselves to decide. It is passing strange indeed, that the three famous Nâdîs of the Tantras, *viz.*, Suṣumnâ, Idâ, and Pingalâ, which, there cannot be the slightest doubt, form the spinal cord, right and left sympathetic cords respectively, have not as yet been identified by any Orientalist. But we believe that as a Tantric work has been rendered into English, greater attention will be bestowed by Oriental scholars in illumining the dark recesses of the Tantric literature, and it is to be expected that within a not very distant date the Chakras, Vâyus, &c., of the Tantras will be more correctly identified."

2. *Osteology.*

The Hindu system of osteology, so far as human anatomy is concerned, which has been thoroughly investigated by Dr. Hœrnle in his learned '*Studies* *in the Medicine*[1] *of Ancient India'* can be known from the following works [2]:—

A.— The System of Âtreya-Charaka :—

1. Charaka Saṃhitâ—Sarirasthâna, VII adhyâya.
2. The Glosses of Chakrapâṇidatta.
3. Bheda Saṃhitâ—Sarîrasthâna, VII adhyâya.
4. The Non-medical version of Yâjnavalkya[3] (III, 84-90). (4th cent. A.D.)
5. The Commentary of Aparârka on „ (India Office MSS.) in 1150 A.D.
6. The Commentary of Vijnâneswara on „ („ „) in 1100 A.D.
7. The Commentary of Sulapâṇi on „ („ „) in the 15th cent
8. The Commentary of Mitramisra on „ („ „) in the 17th cent.
9. The Non-medical version in the Institutes of Viṣṇu[3] (200-400 A.D.)
10. *Vaijavanti*, or the Commentary of Nanda Pandita on Institutes of Viṣṇu, in 1622 A.D.
11. The Non-medical version in the Purâṇas[3]—(i) Agnipurâṇa (369th chapter), and (ii) Viṣṇudharmottarapurâṇa (Part of Garudapurâṇa) which has been quoted by Ballâla Sen in *Dânasâgara* (1100 A.D.)
12. The Non-medical version in the 'Anatomy'— the anonymous work called *Sarîram* (Tubingen University Mss.)

B.—The System of Susruta :—

1. Susruta Saṃhitâ—Sarîrasthânam.
2. Sarîra Padmini (Mss. in the possession of Dr. Cordiar).
3. Commentary on Sarîra Padminî by Vaidyanâtha.
4. Bhâvaprakâsa (Jivânanda's edition of 1875, pp. 40-41).

C.—The System of Vâgbhata I :—

1. Aṣtânga Sangraha (Bombay, Vol. I, p. 244, ll. 3-13.)

D.—Miscellaneous Texts :—

1. Susruta and Vâgbhata on muscles—
   - (*a*) Susruta Saṃhitâ—Sarîrasthâna, Ch. V, cl. 33.
   - (*b*) Dallana's commentary extracted from Jivânanda's edition, p. 578.
   - (*c*) Vâgbhata I, (Bombay) Vol. I, p. 225, ll. 20-21.
2. Susruta on Dissection.
3. Susruta on Homology in Sarîrasthâna, Ch. Vi, cl. 29.
4. Susruta and Vâgbhata on the Eye-ball—
   - (*a*) Uttaratantra, Ch, I, verses 16*b*, 17*a*.
   - (*b*) Aṣtânga Sangraha—Sarîrasthâna, Ch. V, Vol. I, p. 233, l. 10.
5. Bhoja on *nalaka* or reed-like bones, as reported by Dallana (Jiv., p. 576) and Gayadasa.

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[1] Published by the Clarendon Press, Oxford, 1907.

[2] See pp. 185-242.

[3] "The Law-Book of Yâjnavalkya is the original source of the non-medical version, from which it passed into the Institutes of Viṣṇu and into the two Purâṇas." Hoernle, p. 44.

6. Dallana on the aggregate ten (*Jiv.*, p. 576)
7. Susruta and Vâgbhata on the number of ***kurcha***.
8. Susruta and Vâgbhata on the number of ankles.
9. Susruta on the position of cluster and cluster-head.
10. Dallana, Gangâdhara and Nanda Pandita on the collar-bone.
11. Susruta and Vâgbhata on the position of scapula and clavicle.
12. Susruta on the number of scapula and clavicle.
13. Susruta on Amsakuta.
14. „ „ Amsapitta.
15. Râjanighantu and Amarakoṣa on Bhaga.
16. Susruta and Vâgbhata on Jatru and Grivâ.
17. Susruta, Vâgbhata and Mâdhava on the Valmika disease.
18. Susruta on Urdhwajatru and Jatrurdhwa.

E.—The System of the Vedas :—

1. The Śatapatha Brâhmaṇa[1] on the Total Number of Bones and Bones in the Head and Trunk (X, 5, 4, 123; XII, 2, 4, 9-14).
2. The Śatapatha Brâhmaṇa on Costal Cartilages (VIII, 6, 2, 7, 10).
3. The Atharva Veda on the Sekleton (X, 2, verses 1-8).

The 'wondeiful structure of man' is thus described in the *Atharva Veda*[2] (X, 2):

"1. By whom were brought the two heels of a man? by whom was his flesh put together? by whom his two ankle joints? by whom his cunning fingers? by whom his apertures? by whom his two *uchlakhas* in the midst? who put together his footing (*pratisṭhâ*)?

"2. From what, now, did they make a man's two-ankle-joints (*gulpha*) below, his two knee-joints above? separating his two back-thighs (*janghâ*), where, forsooth, did they set them in? the two joints of his knees—who indeed understands that?

"3. There is joined, four-fold, with closed ends, above the two knees, the pliant trunk; what the hips are, the thighs,—who indeed produced that, by which the body became very firm?

"4. How many gods (and) which were they, who gathered the breast, the neck-bones of man? how many disposed the two teats? who the two collar-bones? how many gathered the shoulder-bones? how many the ribs?

"5. Who brought together his two arms, saying "he must perform heroism"? what god then set on his two shoulders upon the body?

"6. Who bored out the seven apertures in his head? these ears, the nostrils, the eyes, the mouth? in the might of whose conquest in many places quadrupeds (and) bipeds go their way.

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[1] Hoernle's *Indian Med.*, pp. 105-6.

[2] See the translation and notes in the Harvard Oriental Series, Vol. 8, pp. 567-72. Dr. Hoernle's translation on pp. 110-11 of his work differs slightly from this.

"*7. Since in his jaws he put his ample tongue, then attached to it great voice; he rolls greatly on among existences, clothing himself in the waters: who indeed understands that ?*

"8. Which was that god who (produced) his brain, his forehead, his hind head, who first his skull, who having gathered a gathering in man's jaws, ascended to heaven ? [1]"

Its composition is traditionally ascribed to Riṣi Nârâyaṇa, author of the famous hymn on the sacrifice of man (called Puruṣa-sukta), perhaps also a medical man responsible for certain formulæ, *e.g.*, the recipe for the preparation of a medicated oil in Bower MSS. Part III.

3. *Varâhamihira.*

To the above survey of Hindu anatomical literature we should also add the non-medical treatment of the human body in LXVIII chapter of Varâhamihira's *Brihat Samhitâ.* This chapter on the physical features of man called *Puruṣalakṣaṇam*[2] begins thus : "A learned person shall examine a man's (1) Kṣetra (body), (2) Mrijâ (complexion), (3) Swara (voice), (4) Sâra (strength), (5) Saṃhati (joints), (6) Sucha (gloss), (7) Varṇa (colour), (8) Anuka (shape of the face), (9) Unmâna (height), (10) Mana (weight), (11) Prakriti (disposition), (12) Gati (gait) and then predict his fortune." We meet in this chapter with such terms of human anatomy as nails, heels, sinews, ankle, shanks, thighs, knees, loins, abdomen, sides, belly, navel, skin, nipple, bosom, collar-bones, neck, arm-pit, shoulders, arms, fingers, wrists, palm, thumb, fore-finger, chin, lips, tongue, face, ears, cheek, nose, eyes, brows, temples, head.

APPENDIX C.

4. *Dr. Seal on Hindu Physiology and Biology.*

For Seal's notes on Hindu Ideas about Nervous System of Tantras, Vital Force, Heredity, &c., see *Appendices*.

(*b*) *The Scientific Value of Hindu Anatomy.*

By a comparison of the Vedic osteological system with those of Âtreya-Charaka and Susruta, Dr. Hoernle proves :—

(1) The "system of the Atharva-Veda more nearly approaches the system of Âtreya-Charaka than that of Susruta ;" and belongs to the "semi-mythical period of the history of Indian medicine." (circa 1000 B.C.)

(2) In the time of Yâjnavalkya, the traditional author of *Satapatha Brâhmaṇa*, who is said to have flourished at the court of Janaka, king of Videha, contemporary of King Ajâtasatru and Buddha, *i.e.*, about 500 B.C., "both the medical schools of Âtreya and Susruta were in existence;" and "he possessed some knowledge of their respective theories on the skeleton.

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[1] The remaining verses of the hymn refer to the 'numerous things dear and not dear,' ruin, pleasure, &c., and altogether give a complete picture of social, political and moral aspects of human existence.

[2] Sanskrit Text in the *Bibliotheca Indica* (Calcutta, 1865).

As for Vâgbhata's osteological system, Hœrnle proves that the principle on which his list of bones is constructed is "to take the list of Susruta as its basis and add to it such items of the list of Charaka as do not occur in it," and that it is really a "combination of the two."

The scientific value of Hindu anatomy would, therefore, depend on that of the osteological systems of the two principal schools of medicine. "According to modern anatomy,[1] there are about 200 bones in the adult human skeleton. The early Indian anatomists, on the other hand, count either 360 (Âtreya) or 300 (Susruta) bones. This large excess is principally due to the fact that (besides including the teeth, nails and cartilages) they counted prominent parts of bones, such as are known as 'processes' or 'protuberances,' as if they were separate bones." As for the difference in the systems of Charaka and Susruta, Dr. Hœrnle remarks :[2] "The statement of Dr. Wise (*Hindu System of Medicine*, p. 52) that the 'difference [between Susruta's total 300 and Charaka's total 360] is owing to their counting the cartilages with the bones' is hardly correct. Both writers include cartilages in their counts, though in different ways. The difference in their totals is mainly due to Charaka's counting the 32 sockets of the teeth as separate bones, and his including the 20 nails, neither of which are admitted in the count of Susruta."

In the third section of his work, that on the anatomical identifications, Hœrnle's verdict on the Hindu systems of osteology is given. He says : "The views of the early Indian anatomists are surprisingly accurate. This is due to the fact that they were accustomed to the practice of preparing the dead human body for actual examination, and that, therefore, their views were the direct result of an experimental knowledge of the skeleton. It is true that the compendium of Charaka contains no reference whatever to the practice of human dissection ; and it must, therefore, remain doubtful whether, and to what extent, that practice was observed in the school of Âtreya. But there can be no doubt as to the practice being known and observed in the school of Susruta, for his compendium contains a passage[3] which gives detailed instructions regarding the procedure to be adopted in preparing a dead body for anatomical examination."

The following remarks from his Preface may also be quoted : "Probably it will come as a surprise to many, as it did to myself, to discover the amount of anatomical knowledge which is disclosed in the works of the earliest medical writers of India. Its extent and accuracy are surprising, when we allow for their early age—probably the sixth century before Christ—and their peculiar methods of definition. * * * No satisfactory knowledge of human anatomy can be attained without recourse to human dissection. * * * It is worthy of note, however, that in the writings of neither of these two oldest Indian medical writers is there any indication of the practice of animal

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[1] Hœrnle, p. 115. The explanation for counting in this manner has also been given.

[2] P. 81.

[3] The passage occurs at the end of the fifth chapter of *Sarîrasthâna, vide* Hœrnle, pp. 116-117, 225-226.

dissection. The only mention of an animal subject is in connexion with training in surgery. Thus 'puncturing' is to be practised by the medical pupil 'on the veins of dead animals and on the stalks of water-lily,' similarly, 'extricating,' on the pulps of various kinds of fruits and 'on the teeth of dead animals.'

(*c*) *Propagation of Anatomical Knowledge in Hindu India.*

In ancient and mediæval India the knowledge of anatomy, whether elementary or advanced, was extensively diffused. There are reasons to believe that it was almost universal and not confined only within the circle of students and young men, called Brahmachâris, who received lessons in one or other of the various types of educational institutions. It was scattered broadcast through conventions, traditional usages, canons or rules of art and industry, social and religious practices, Tantric rites, and numerous popular ceremonies among the millions whose vocation in life was no nobler than what in terms of modern socio-economic science may be grouped under (*a*) mechanical or automatic manual work, (*b*) responsible or intelligent manual work or even (*c*) mechanical or automatic brain-work.

The reasons are not far to seek. It is superfluous to remark that it is the numerous schools of Hindu medicine that have preserved and more or less developed the medical knowledge and literature of India through the ages. In every part of the country these have been the direct fountain heads of anatomical research and investigation, and have propagated through their professoriat and alumni, whose number has ever been considerable, the knowledge of the parts of the human (as well as animal?) body among the lay non-medical community at large. The importance attached by ancient Hindu thinkers to anatomical knowledge is to be gathered, however, from the provision they made for its inclusion in the curriculum of studies even for those scholars who would not specialise in Ayurveda. We are thus led to surmise that they wanted to make it an integral part of the liberal education of non-medical Brahmachâris also, and to form an estimate of the pedagogic theory that underlay their educational movements.

There is no doubt that, under the regulations of the Hindu Universities of ancient and mediæval India, a course of anatomy had to be offered by students of law (and social science), Theology as well as of Astronomy (and Astrology). The incorporation of anatomical chapters in some of the traditional text-books on Smriti Sâstras, Dharma Sutras, Purâṇas, Jyotiṣa, &c., and the commentaries on them by successive schools of scholars who were generally non-medical men, undoubtedly point to the facts—

(1) that even those who would not study Ayurveda did not go without a few lessons in anatomy (something like the 'short-term courses' in modern western Universities),

(2) that even non-medical men had sufficient knowledge of the subject to write commentaries on the medical topics in the treatises on Law, Sociology, Religion, &c.

(3) that the anatomical chapters of non-medical *Sâstras* corresponding to the anatomical primers and handbooks of modern times, had an important position in the literature of Hindusthan ; and, as integral parts of social and religious works, which may be looked upon as more or less the *Encyclopædia Indicas*, found a place in every man's library.

We have already noticed in connexion with the survey of Hindu anatomy, what Hœrnle[1] calls the "Non-medical version" of Âtreya-Charaka's System of Osteology. This non-medical version is found (*a*) in two religious text-books, *viz.*, (1) *Viṣṇudharmottarapurâṇa* and (2) *Agnipurâṇa*, and (*b*) in two legal text-books, (1) *Yâjnavalkya Dharma Sâstra* and (2) *Viṣṇu Smriti*. There are certain particulars with regard to the incorporation of anatomical chapters in these works which point to the recognition of their importance to non-medical students by those responsible for it.

In the *Institutes of Viṣṇu* "the passage is in no way required by the context * * incorporated into the text from some other work." Hœrnle believes "the passage was inserted into the *Institutes* by some one who was familiar with the Mitâkṣarâ[2] commentary on the Law-Book." The prose statement in *Viṣṇu* is only a paraphrase and "otiose amplification" of the metrical section in *Yâjnavalkya*. Again, a comparison of the 369th chapter, called *Sarirâvayavah*, or Parts of the Human Body, in the *Agnipurâṇa* with the chapter on Anatomy in the *Viṣṇudharmottarapurâṇa* shows that about two-thirds of its contents are "literally plagiarised from it." "The Law-Book of Yâjnavalkya is the original source of the Non-medical version, from which it passed into the *Institutes of Viṣṇu* and into the two Purâṇas."

Without entering into a discussion of the differences in the anatomical knowledge displayed in these non-medical treatises, it would be sufficient for our purposes to remark that the tendency of incorporating medical chapters with non-medical works.

(1) began as early as at least the 4th century A.D.), when Yajnavalkya, author of the celebrated Smriti, is supposed to have flourished ;

(2) that it has been kept up by latter-day professors of Theology and Sociology, *e.g.*, (i) in the Viṣṇudharmottara (at least as early as 1100 A.D.), (ii) in Viṣṇu Smriti (at any rate before 1622[3] A.D.) and (iii) in the Agnipurâṇa (at the latest 1650 A. D.) ;[3]

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[1] Pp. 40-46.

[2] "Whoever drew up the list as we find it in the *Institutes*, did so on the basis of Vijnânoswara's interpretation; and accordingly the introduction of that list in the *Institutes* cannot be placed earlier than the date of Vijnâneswara, that is after 1100 A.D. Seeing that the *Institutes of Viṣṇu* appears to be often quoted in the Mitâkṣarâ, it does not seem impossible that the appearance of the list in the *Institutes* is due to Vijnâneswara himself." Hœrnle, pp. 59-60

[3] Those dates refer to the introduction or interpolation of the anatomical chapters in the works, not to the general body of the works themselves.

and (3) that it has been preserved by the efforts of successive schools of lay commentators to explain the medical ideas, according to the culture of the ages in which they lived, *e.g.*, (i) Vijnâneswara (Mitâkṣarâ, c. 1100 A.D.), (ii) Aparârka, who though a near contemporary of Vijnâneswara (1150), holds an independent view in the interpretation of Yajnavalkya, (iii) Sulapāṇi (15th cent.) and (iv) Mitra Misra (17th century), both following the lead of Vijnâneswara.

The same conclusion is arrived at by the fact that a small manuscript, called *Sarira*,[1] or anatomy, has been discovered in the collection preserved in the Tubingen University Library. Its age and author are unknown. Its versified contents are compiled from many different sources, some of which are quoted by name, *e.g.*, Charaka, *Yogamuktâvali*, *Kaulâvali*, &c. Its statement on the Skeleton is taken from the Law-Book of Yâjnavalkya, though the source is not named. But an important error of Yajnavalkya " was detected and corrected by the unknown author of the *Anatomy*."

The extract from the *Brihat Saṃhitâ* quoted previously also points to the intimate association of anatomy with general Hindu literature and its place in the scheme of education in *Jyotiṣa* (which is not equivalent to what in modern times is called Astronomy, but includes Astrology, Mathematics and many other topics of a social and economic nature). From the very definition of the scope and province of Jyotiṣa and of its three branches—*Horâ*, *Tantra* and *Anga-vinischaya*—as well as the description of the Jyotiṣaka,[2] or the man versed in Saṃhitâ, Astronomy, and Horoscopy, it would be clear that atleast such knowledge of anatomy, physiology, and embryology, as furnishes a working idea of the parts of the body, the nativity, external features of man and animals, is an essential item in the equipment of the students of this science.

From considerations like these relating to the scope of Hindu literature on non-medical subjects we are reasonably led to believe that in ancient and mediæval India no Hindu Brahmachâri was left without the knowledge of a little anatomy; and that the references to limbs or features of human or animal life that we meet with in poetical works, Silpasâstras, Tantras, sacrificial and religious catechisms, or allegorical, moral and didactic treatises are not due to commonplace observations that may be expected of the man in the street, but presuppose, in the absence of evidences to the contrary, the education received by the poets, priests, moralists, story-tellers, scientists and scholars, in their *Brahmacharya Âsram.*

It is this universality of the anatomical instruction imparted by the *gurus* or professors to their pupils which explains the popularisation of knowledge about parts of the body among the community, and its influence on the arts and industries designed to imitate or reproduce human beings or animals. It is this, again, which has left its mark on the Theory and Philosophy of Hindu Art including Architecture, Sculpture and Painting. The 'masters' are very strict in their injunctions that the sculptors and painters should follow with religious and mathematical accuracy, the anatomical measurements laid down by them regarding the construction of images of gods and their *vâhanas* or conveyances or symbols.

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[1] Hœrnle, pp. 61-622-67.

[2] See the first two chapters of *Brihat Saṃhitâ.*

These canons of Hindu art prove (1) a thorough knowledge of anatomy on the part of the promulgator and (2) their desire to perpetuate and propagate, through more or less durable embodiments, the national ideals of beauty in art as consisting in the closest conformity of artists with the specimens of symmetry and order exhibited by Nature in her great museum of the living universe. Once presented in art, the canons became conventional and have been traditionally followed by sculptors, painters, artists and craftsmen, even by those among them who had not received theoretical or demonstrational lessons in anatomy at schools, from books or from professors. And, besides satisfying the spiritual sense of generations of devoted spectators, both educated and illiterate, these images and works of plastic and other arts have served for them the double purpose of anatomical models as well as object-lessons in æsthetic perfection ;—being at once the national schools of religious, secular and artistic education and culture.

(*d*) *Human Anatomy in Sukraniti.*

The Sukra authors must have had adequate knowledge of human and animal anatomy, as is evident from their care in noting, according to the injunctions of specialists in art-literature, the features of the body in the section on images of gods, and also the external characteristics of animals in the treatment of the economic topics connected with them. The names of the parts of the human body, and their measurements according as the images are to be 7, 8, 9, 10 or 12 *tâlas* (feet) high, will be described in the chapter on the Data of ancient Indian art. Here we shall mention the anatomical features described by Sukrâchâryya in the section on the animal-force of the Hindu state.

(*e*) *External Anatomy of Horses, Elephants, &c.*

It is only the horse that has been fully described in *Sukraniti.* The Sukra authors have given the measurements of the limbs of horses, most probably, as it would appear, to help sculptors in their art. For say they: "If an image[1] is to be made, the appropriate pattern or model should always be placed in front. No image can be made without a model. So the artist should frame the limbs after meditating on the horse, and finding out the measurements and attributes of horses in the manner indicated above." The place of animal-anatomy in Hindu art is quite clear from this extract. But Sukrâchâryya intends these measurements to be remembered also by non-artists, *i.e.*, lay men, whether merchants or rulers or warriors in their sales and purchases of horses.

The general remarks on the quality of horses as known from the proportion between the parts of their body are given in IV, vii, 85-95.

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[1] **Sukra IV, vii, 145-47.**

We have to remember two things about horse-measurements :—

(1) 5 yavas = 1 angula.

(2) The limbs of horses are to have a fixed proportion to the face.

The quality of horses is indicated thus :—

The best horse has a face of	**24 angulas.**
Second class " "	**36**
Third class " "	**32**
Inferior or ordinary "	**28**

Ordinary horse-measurements are given below :—

Height or stature	**3 faces.**
Length	**4⅓ "**
Girth	**3+3 angulas.**

The following are the measurements of the 28 angula-type of Horses :

(*i*) *Heights.*[1]

1.	**Heel or hoof (*Śapha*)**	**3 angulas.**
2.	**Ankle-joint or fetlock (*Maṇivandha*)**	**4 "**
3.	**Foreleg or shanks (*Janghá*)**	**20 "**
4.	**Knee (*Jánu*)**	**3 "**
5.	**Fore-thigh or elbow (*Uru*)**	**14 "**
6.	**Thigh to neck**	**38 "**
7.	**Hind thighs (*Uru*)**	**28 "**
8.	**Hind legs (*Janghá*)**	**21 "**
9.	**Neck[2]**	**18 "**

(*ii*) *Lengths.*[3]

1.	**Neck (Grivâ)**	**60 angulas.**
2.	**Body (from end of neck to organ)**	**60 "**
3.	**From organ to end of vertebral column**	**18 "**
4.	**Tail (*Puchchhadaṇḍa*)**	**14 "**
5.	**Genital organ**	**14 "**
6.	**Testicles**	**14 "**
7.	**Ear**	**6, 4 or 5 angulas**
8.	**Mane or hair of neck[4]**	**1 cubit.**
9.	**Hair of tail[5]**	**1½ or 2 cubits.**
10.	**Eye[6]**	**3 or 4 angulas.**

(*iii*) *Circumferences.*[7]

1.	**Heel or hoof**	**15 angulas.**
2.	**Ankle-joint**	**7½ "**
3.	**Foreleg or shanks**	**7½ "**
4.	**Fore-thigh**	**11 "**
5.	**Hind thigh**	**88 "**
6.	***Hock of the ankle-joint***	**9 "**
7.	**Hind leg**	**7½ "**

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[1] **Sukra IV, vii, 96-101.**

[2] **Sukra IV, vii, 104.**

[3] **Sukra IV, vii, 103-108.**

[4] [5] [6] **Sukra IV, vii, 118-122.**

[7] **Sukra IV, vii, 109-115.**

8.	**Forepart of neck** [1] ...	... 32 „
9.	**End of neck** [2]	... 46 „
10.	**Forehead** [3]	... 36 „
11.	**Face at the nose below the eye** [4]	... 19 „

(*iv*) *Distances, breadth, width or space.*

1.	Between two thighs at the back	... 1 angula.
2.	The neck on which hair grows	... 1½ „
3.	Ear	... 3 or 4 angulas
4.	Breast	... 19 „
5.	Eye	... 2 or 2½ „
6.	Between two thighs ...	... 9 „
7.	„ „ eyes ...	... 5 „
8.	„ „ ears ...	... 5 „
9.	„ eye and ear ...	... 5 „
10.	„ two heels ...	...6, 7, &c. „
11.	„ two pupils of eyes...	... 9 „
12.	„ „ eye-brows ...	... 9 „
13.	„ eye and nose ...	... 9 „
14.	„ two nostrils ...	... 3 „
15.	„ arms at breast ...	... 4 „
16.	Lower lip	... 1½ „
17.	Upper lip	... 9 „
18.	Between back and breast ...	... 1¾ cubits.

About Elephants the following measurements are given in IV, vii, 77-84.

[*N. B.*—8 yavas = 1 angula
24 angulas = 1 cubit.]

	Bhadra.	Mandra.	Mriga.
Height	7 cubits.	6 cubits.	5 cubits.
Length	8 „	8 „	7 „
Girth	10 „	9 „	8 „

About Bulls Sukra authors record the following measurements in IV, 299-302 :—

Girth = 4 times face.
Height + hump = 3 „
Length = 3½ „

The best animal has 7 *tâlas* or feet in height.

The good height of camels is known to be 9 *tâlas* or feet.[5]

(*f*) *Dentition and Age of Animals.*

The following table gives the duration of the periods of youth,[6] manhood and old age, as applied to the five principal vertebrates :—

	Maximum age.	Youth.	Middle age.
Man	... 100 years.	20 years.	60 years.
Elephant	... 100 „	20 „	80
Horse	... 34 „	5 „	16
Bull	... 25 „	5 „	16
Camel	... 25 „	5 „	16

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[1] Sukra IV, vii, 124-128. [5] Sukra IV, vii, 304-5. [6] Sukra IV, vii, 306-313.

The age of both bulls and horses is to be known from the growth and colour of teeth.[1] *There is no information about the tusks of elephants.*

The whole dental structure of horses is thus described in the ***Fauna of British India*** :—

" Dentition : Incisors $\frac{6}{6}$, Canines $\frac{1-1}{1-1}$. Premolars $\frac{3-3}{3-3}$, Molars $\frac{3-3}{3-3}$, Canines generally wanting in females. There is sometimes an additional small anterior upper premolar. The incisors have a flat crown, with at first a deep hollow in the middle ; this (the " mark " in horses) disappears with age."

It is evident that Sukrâchâryya, in describing the changes in the development and colour of the six teeth as the guide to the age of horses, is referring to the Incisors or Anterior teeth. This is the practice recognised by the modern science of equine dentistry also. The structural changes in the Back teeth, called Molars or Grinders, afford a very good index of the age of the horse up to the period when they are completed, namely, four years old. But after the fourth year the molars are not often taken into consideration in determining the age of the horse.

Further, these six incisors described in *Sukraniti* do all belong to the lower jaw. Fitzwygram also in his chapter on ' age,' as indicated by teeth, confines his remarks to the incisors of the lower jaw, " as the structural changes which take place in the upper are nearly similar. "

The distinction between Temporary or Milk Incisors and Permanent Incisors, as given by Sukra authors, both as regards the time of development and discolouration, is also borne out by modern science. " The discolouration is due to the lodgement of the juices and other matters connected with the food in the grooves."

The following extract from *Horses and Stables* coroborrates the Sukra theory of Dentition stated in IV, vii, 315-20 : " The foal is born with his teeth in a rudimentary state in the gums. * * * The yearling is complete in all six incisors (315), but several well-marked signs distinguish his mouth from that of the two years old (316). * * * A few months before 3 years old, the horse sheds the two centre milk-teeth which are replaced by permanent. * * * A few months before four, the horse sheds the two next milk-teeth which are replaced by permanent (318). * * * A few months before five the horse sheds the two remaining milk-teeth which are replaced by permanent (319.) Thus the jaw is now furnished with six permanent incisors."

After the dental structure is complete, the guide to the age of horses is colour, as detailed by Sukrâchâryya in IV, vii, 320-324. This is the modern theory also. Says Fitzwygram : " At and after six, we are compelled to have recourse to the indications given by the marks and other slight but gradual alterations which take place in the form of the teeth and their position. * * * The mark is in a constantly changing condition."

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[1] **Sukra IV, vii, 314.**

[2] **Pp. 418-19.**

The science of equine dentistry has been treated by the authors of *Aswavaidyaka* and *Aswachikitsita* published in the Bibliotheca Indica Series. There is a general agreement between Sukrâchâryya, Jayadatta and Nakula as regards number, colour and development of the teeth as well as their help in the determination of age. Jayadatta deals with the subject in the 4th chapter, and Nakula in the 5th chapter of their works. The traditional order of colour 'black, yellow, white, glass, honey, and conch' is the same in all the three works.

The changes in the colour of horses' teeth according to age, as indicated in Sukra IV, vii, 315-25, are given below :—

1st year ...	white.
2nd „ ...	black and red.
3rd—6th year	black.
6th—9th „	„
9th—12th „	yellow.
12th—15th year	white.
15th—18th „	glass.
18th—21st „	honey.
21st—24th „	conch.

Since 24th year[1] the teeth get loose and separated and begin to fall down every three years. The horse that has attained full age gets three circular rows on the upper lip. The age is to be considered low in proportion as the rows are less.

Regarding the dentition and age of bulls[2] we read :—

(1) All the eight white teeth of bulls grow in their 4th year. The two extreme teeth fall down and are replaced in the 5th ; in the 6th, the next two ; in the 7th, the next two ; and in the 8th, the central two.

(2) Every two years the teeth get black, yellow, white, red and conch-like in order. Then their looseness and fall commence.

Thus each colour lasts for two years. And as all the teeth get finally replaced in eight years, the colour changes up to the 18th. It is evident that Sukrâchâryya means the eight incisors of the lower jaw; as would appear from the dentition of the Bovide described by Murray in the *Vertebrate Zoology of Sind* : "Teeth of two or three kinds. Incisors eight below. Molars six on each side in each jaw. Canines more or less developed. Front of upper jaw toothless."

Sukra authors say nothing particularly about camels. We are simply told that the age of camels has to be understood from considerations like these.[3]

SECTION 17.

Organisation of the Veterinary Department in Sukra Polity.

In the previous sections we have dealt with what the Sukra authors have recorded about the Zoosphere of their country in both its biological and economic or utilitarian aspects. We have found that the main references in *Surkanîti* to the live-stock of the land are from the standpoint of the state, especially its military department. The live-stock as belonging to the people have been but casually noticed and have to be inferred from the incidental analogies and illustrations and from the passing remarks in connexion with revenue, agriculture, commerce and industries. It is, therefore, natural that the authors should supply some information about the management and administration of the Veterinary Department in their state.

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[1] Sukra IV, vii, 325-7.

[2] Sukra IV, vii, 332-37.

[3] Sukra IV, vii, 338.

The Veterinary Department of the Sukra state does not, however, attend to the military live-stock exclusively, though details about this only are available in Sukranîti. It is an organisation addressing itself to the needs of the total live-stock of the state, agricultural cattle, draught-animals, the Fauna in the Zoological Gardens or State Forests, as well as the Animal-Corps, and may be taken to have been divided into two branches, Civil and Military.

The administrative machinery of the Sukra Polity consists of a highly differentiated Bureaucracy divided into special Departments or Bureaus for the management of executive affairs. The Veterinary Department (Civil and Military) is one such Bureau presided over by one of the highest Executive Heads called Ministers or Secretaries, and supervising, guiding and controlling the work of varying grades of officers entrusted with the charge of sectional and sub-sectional affairs. The hierarchy from the menials at the lowest rung of the official ladder to the highest functionary through intermediate grades of officers is complete in the Veterinary as in the many other departments of the Sukra state.

The Sukra Polity recognises 10 *Prakritis*[1] (Executive Councillors, Departmental Heads, Ministers or Secretaries). These are (1) *Purodhâ* (Priest), (2) *Pratinidhi* (Viceroy), (3) *Pradhâna* (Superintendent, Chief Secretary or Prime Minister), (4) *Sachiva* (War Secretary), (5) *Mantri* (Foreign Secretary or Diplomatist), (6) *Pandita* (Learned Adviser or Law Secretary), (7) *Prâdviveka* (Chief Justice), (8) *Amâtya* (Land Revenue Secretary), (9) *Sumantra* (Finance Minister), (10) *Duta* (Ambassador or Spy), in order of precedence and dignity. Sukrâchâryya states another theory[2] according to which the Prakritis are 8, excluding the priest and the spy. But according to him "the priest[3] is superior to all others—the mainstay of the king and the kingdom," and the spy[4] is a "servant of the rest." The priest and the spy are thus too important to be ignored in the enumeration of the *Prakritis*. So Sukra authors reject the Doctrine of Eight Councillors.

The organisation of the Veterinary Department is typical of all the rest in the symmetrical and scientific scheme devised by the Sukra statesmen. The picture presented in *Sukranîti* is not one of a simple primitive political life in which the man in the street is fit to be a judge, a warrior and a ruler by turns

Sukra II, 141-143.

Sukra II, 145-47.

[3] Sukra II, 150.

[4] Sukra II, 140.

as in the ancient city, states, but one of a complex organisation which requires specialised functionaries for the discharge of its functions, and hence demands of each a specialised training as Judge, Financier, Commander, etc.

The department of the veterinary interests of the state is managed in the following way :—

I.—The King is not a mere "dignified part" of the Sukra constitution. Besides serving the purpose of an ornamental figurehead, he has to discharge several important functions, and is thus an "efficient part"[1] also.

According to the Code of Education for princes the king is bound to be a good sportsman. So far as the Veterinary Department is concerned, "he has to spend one *muhurta* (48 minutes) at dawn in exercises over elephants, horses, &c., spend four *muhurtas* over (among other things) writing orders relating to the army, spend two *muhurtas* in consultation with the Chief Justice and *other ministers*, the same period in hunting, &c., one *muhurta* over military exercises, &c."

The king's contact[2] with the department of live-stock is further advised in the following lines :

"He should every morning and evening exercise himself with elephants, horses, chariots, and other conveyances. And he should learn as well as teach the military arrangements of soldiers. He should sport with tigers, peacocks, birds, and other animals of the forest, and in the course of the hunting should kill the wild ones."

The following rules[3] bring out, again, the very important function of the king in Sukra Polity generally, and in its Veterinary Department in particular : "The ministers are likely to be dumb (*i.e.*, silent) through the passions, cupidity, and fear of the king. The king should receive in written form the opinions of each separately with all his arguments, compare them with his own opinion and then accept the will of the majority. The king should every day examine the elephants, horses, chariots, cattle, servants, officers, provisions and soldiers, and preserve or maintain the able and give up the very old."

II.—The Sachiva (War-Minister) and his Council :

(*a*) The main brunt of the administration of the veterinary interests of the state falls, of course, on the War-Minister, the Sachiva. The constitutional position of ministers or *Prakritis* in the Sukra state and their relations with the king as well as among themselves need not be discussed here. We have to note simply that one of the many items of business that come up before, and have to be administered by, the Portfolio of *Sachiva*, is that relating to the Civil and Military sections of the Veterinary Department of the kingdom. Thus we read that "the *Sachiva*[1] has to study the elephants, horses, chariots, foot-soldiers, camels, oxen, bandsmen, &c., * * * and communicate the result of his studies to the king."

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[1] See the king's daily routine and time-table of work framed by Sukrâchâryya I, 551-570. *Vide* also I, 660, 670-3. The king's important position in the administration of justice has also to be noted. All these topics will be treated at length in Vol. II. (Political).

[2] Sukra I, 663-666. It may be noticed here that Kâmandaka also in his *Niti Sástra* provides for a regulated exercise with the wild games, &c., in State Forests, though he is very particular against the vice or *vyasana* of hunting.

[3] Sukra I, 730-35.

(*b*) Like the other Prakritis or Ministers, the War-Minister, also is not to be alone in his jurisdiction. Like the *Pradhâna* and others, the *Sachiva* is to have a council consisting of two members besides himself:

"The king should always appoint three men[2] for each department—the wisest of them all at the head and two others as overseers, for 3, 5, 7 or 10 years, and, having noticed each officer's qualifications for the entrusted work, should make the necessary changes." This War-Council with its President, the *Sachiva*, is thus the real focus of responsibility regarding the Veterinary Department.

III.—The officials of "generalised ability" (and of higher rank):

(*a*) The administrative system of Sukrâchâryya is highly specialised, as we have noticed above. With regard to the Veterinary Department the rule is that the king should appoint separate officers as "the heads or Superintendents[3] of elephants, horses, cattle, camels, deer, birds," &c.

The Civil Service Regulations applicable to all the officials in the State are indicated by the following: (i) "As the officer becomes qualified[4] for the higher and higer functions, he should be appointed to the higher and higher posts. At the end he should be a *Prakriti* (*i.e.*, one of the 10 highest Executive Councillors). (ii) The king should appoint many overseers, superintendents, or only one officer, without any overseer at all, according to the importance of the jurisdiction to be managed.[5]

(*b*) The superintendents in charge of the live-stock[6] may be recruited from, among others, the members of the royal family.

(*c*) The Superintendents or the higher grade office-bearers (something like the Gazetted Officials of modern times) of the Veterinary Department are being described below. These are to have the qualifications for understanding the general interests bearing on the species of live-stock in the charge of each.

(1) *The Superintendent of Elephants*[7] (*âdhoraṇa*): The man who knows of (i) the various species of elephants, *e.g.*, Prâbhadra, Airâvata, Pundarika, &c., (ii) their treatment, diseases and art of rearing them, (iii) the methods of training them, (iv) who can discover and distinguish their qualities by studying the roof the mouth, the tongue, the nails, &c., (v) who knows how to mount them and guide their movements should be appointed to take care of elephants;[8]

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[1] Sukra II, 181-90.

[2] Sukra II, 220-24.

[3] Sukra II, 237-38.

[4] Sukra II, 232-33.

[5] Sukra II, 234-35.

[6] Sukra I, 699.

[7] Sukra II, 256-59.

[8] According to Kautilya this officer called *Hastyadhyakṣa* has two functions: (1) to see that the Elephant-Forests are well-protected (by the officer called *Nâgavanapâla* and his ministerial staff), and (2) to superintend the internal managements in the Elephant stables and the proper training by experts. This second function only has been described by Sukra.

for he is sure to captivate their heart. This officer must have graduated in the whole science of Elephants in both theoretical and practical, as well as biological and economic branches.

(2) *The Superintendent of Horses* (*aswâdhipati*). The man (i) who knows[1] of the feelings of horses, and (ii) can discover and distinguish their qualities by studying their breeds, colour and feathery rings, (iii) who knows how to guide, train and treat them, (iv) and is aware of their mettle, spirit and diseases, (v) who knows what is good and bad nourishment for them, (vi) who knows of their weight, their gait, their capacity for bearing weights, their teeth and their age, (vii) and who, besides, is valorous, an adept in military parades and is wise, should be appointed to the superintendentship of horses. The qualifications for this officer are a thorough mastery in the whole science relating to horses and horse life.

(3) The Superintendents of Bulls and Camels corresponding to those of Horses and Elephants, and Officers of the same grade relating to agricultural cattle, Birds and other species of Live-stock have not been described in Sukranîti, but may be inferred to have been such persons as were well-qualified in the sciences bearing on the Fauna in question.

IV.—Experts, ministerial officers and menials :

The officers and men connected with the actual tending and management of live-stock must be specialists in the narrower range of duties classified according to the principle of the Division of Labour. They need not be well up in the solution of general problems affecting the department or have a wider and more comprehensive outlook than what is absolutely necessary in attending to the 'details' and minuter points of their work. They are what in terms of modern social sciences would be called the men of "specialised skill." As a matter of fact, Sukra knows them to be specialists in the two *kalâs* or arts,[2] *viz.*, of (1) driving and (2) training horses and elephants, &c.

About the appointment of such experts and skilled men, *i.e.*, staff of the lower rank, *viz.*, in the Veterinary Department, we have the following rules :—

(i) Those men are to be masters of goats,[3] sheep, cows, buffaloes, deer, &c., who are skilful in tending and rearing them and who have love for these animals.

(ii) Of like qualifications there should be appointed men to serve elephants, camels[4] &c.

(iii) Other officers are those of a warlike disposition, who know how to domesticate birds,[5] teach parrots, and know when hawks fall victims to arrows as well as the inward feelings of these animals.

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[1] Sukra II, 260-63.

[2] Sukra IV, iii. 166.

[3] Sukra II, 297-98.

[4] Sukra II, 299.

[5] Sukra II, 300-302.

(iv) Regarding horses Sukra authors mention three classes of skilled[1] staff:—

(*a*) The *sâdi* or horseman is he who is brave, versed in military parades and battle-arrays and knows of the movements of horses, &c.

(*b*) The *sikṣaka* or trainer of horses is he who (*a*) knows of the 11 kinds of horses' movements: (1) Circular (2) galloping, (3) prancing, (4) trotting, (5) jumping, (6) speedy, (7) slow or sluggish, (8) tortuous, (9) serpentine, (10) rolling or revolving, (11) galloping at full speed; and (β) can break them according to their strength and the uses to which they would be put.

(*c*) The *sevaka* or groom is he who can serve the horses well, who knows how to place the saddles, &c., and who is able-bodied and brave.

In this organisation of the Veterinary Department we have to notice:—

(1) the fact that it is, as in modern states, administered by the Military Portfolio,

(2) the principle of scientific administration that underlies the whole Bureaucratic organisation of modern politics. This is illustrated, in the case of Sukranîti, as we have just noticed—

(*a*) horizontally, by the introduction of specialisation and differentiation of functionaries through a careful division of functions, and

(*b*) vertically, by the gradual introduction of greater and greater degrees of complexity and generalisation into the work of upper grades from the simple, homogeneous, specialised functions of the lowest man at the bottom, *e.g.*, the groom.

It is not possible from Sukranîti to form an estimate of the expenditure on the Veterinary Department. But the *Arthasâstra* supplies substantial information about salaries, wages, fines, rations, &c.

The following extract from Mr. Law's *Hindu Polity* gives a few more members of the Cavalry-Staff, as well as a few rules that obtained under Chandragupta Maurya pertaining to the Department of Live-stock: "The grooms (*Sutragrâhaka*), those who bound them in stables (*aswavandhaka*), those who supplied meadow grass (*yâvasika*), those who prepared the meals of horses (*vidhapâchaka*), those who watched the stables (*sthânapâlaka*), those who dressed the hair (*kesakâra*), and those who detected poison (*jangulividah*) were liable to a fine of a day's wage for neglect of duty. These *jangulividah* were the grooms, the cooks and the veterinary surgeons, for it was they who had to taste the food of the horses."

The two lists of officers given below are supplied by Kautilya:

(*a*) *Relating to the capture of elephants*:

1. Nâgavanapâla (superintendent of elephant forests), different from the *Hastyadhyakṣa* or *Âdhoraṇa* (Sukra) described above.

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[1] Sukra II, 268-75.

2. His assistants:
    - i. *Hastipaka* (driver)'
    - ii. *Pâdapâsika* (who slips nooses round the legs),
    - iii. *Saimika* (boundary guard),
    - iv. *Parikarmika* (servants for miscellaneous works),
    - v. *Vanacharaka* (foresters),
    - vi. *Anikastha* (trainers).

(*b*) Stabling staff:

1. *Chikitsaka* (doctors),
2. *Anikastha* (trainers),
3. *Ârohaka* (drivers),
4. *Âdhoraṇa* (experts who can control the paces of elephants),
5. *Hastipaka* (grooms),
6. *Oupacharika* (attendants),
7. *Vidhapâchaka* (cooks),
8. *Yâvasika* (grass suppliers),
9. *Pâdapâsika*, (who slips nooses round the legs),
10. *Kutirakṣa* (guards),
11. *Upasâyika* (who take care of the animals at night).

APPENDICES

BY

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[It is the privilege of the author to publish along with this work the monographs of Dr. Seal on the mechanical, the physical and the biological theories of the Hindus as well as on the Hindu classification of plants and animals.

It has to be stated with regret that the author could not avail himself of the advantage of discussion with the distinguished savant on the various topics dealt with in the "Positive Background," and that Dr. Seal's papers reached his hands after the work had been in the press.]

APPENDIX A.

HINDU IDEAS ABOUT PLANTS AND PLANT-LIFE.

SECTION 1.

CLASSIFICATION OF PLANTS.

Charaka :—Plants according to Charaka are divisible into (1) *Vanaspatis*, trees bearing fruit without flowers; (2) *Vânaspatyas*, trees bearing flowers as well as fruits; (3) *Auṣadhis*, herbs that wither after fructification; and (4) *Virudhs*, other herbs with spreading stems.

Chakrapâṇi :—Chakrapâṇi notes in his commentary on Charaka: the *Virudhs* comprise two classes (1) *Latâs*, creepers; (2) *Gulmas*, herbs with succulent (or cactaceous) stems and shrubs. The *auṣadhis* are sub-divided into (1) annuals or perennials, bearing fruit, and (2) plants that wither away after maturing and without fructification, *e.g.*, grasses like the *Durvâ* (Cynodon dactylon).

Susruta and Dalvana :—Susruta's division is identical with Charaka's. Dalvana, the commentator, gives some details. The *plakṣa* (Ficus infectoria) and the *Udumvara* (Ficus glomerata) are given as instances of trees bearing fruits without flowers (*vanaspatis*). It appears that plants with naked and incomplete flowers (Achlamydeous plants) were considered as flowerless, as also trees whose flowers like those of the fig are placed on the internal walls of a common receptacle. Of the *Brikṣas* flower and fruit-bearing trees, the mango tree, the *Jambu* tree (Eugenia jambolana) &c., are given as examples. The *virudhs* are of two classes—(1) creepers with stems spreading on the ground (प्रतानवत्य:) and (2) herbs, with succulent (or cactaceous) stems (गुल्मिन्य: or स्तम्बिन्य: वर्तुललतासन्ततिविशिष्टा:). *Auṣadhis* are those that wither away after fructification, *e.g.*, wheat, barley &c., (फलपाकनिष्ठागोधूमाद्य:) Some divide *auṣadhis* into two classes (1) those that wither after bearing fruit, *e.g.*, paddy, linseed, pulses, &c., and (2) plants that wither after maturity, and bear neither flowers nor fruits, *e.g.*, the mushroom, &c.

Praśastapâda :—Praśastapâda, the Vaiśeṣika Doctor, classifies plants as follows :—(1) *Triṇas*, grasses; (2) *Auṣadhis*, herbs that wither after fructification; (3) *Latâs*, spreading and creeping herbs; (4) *Avatânas*, arboraceous plants and shrubs; (5) *Brikṣas*, trees bearing flowers and fruits; and (6) *Vanaspatis*, trees bearing fruits without flowers.

Srîdhara :—Srîdhara in the *Kandali* gives *ulapa* as an example of a grass, wheat as an example of *auṣadhi* (annual), the *ketaki* (Pandanus odoratissimus) and the *Vijapura* (Citrus medica) as examples of *avatânas* (Vitapas, arboraceous plants), the *Kovidâra* (Bauhinia) as an example of flower and fruit-bearing tree and the *audumvara* (Ficus glomerata) as an example of a *vanaspati* (flowerless fruit-bearing tree).

Udayana :—Udayana in the *Kiraṇâvalî* notes the *kuṣmânda* (a species of Cucurbita) as an instance of a creeper (*latâ*), and the palms तालाद्य: as modifications of the grasses *Triṇas*.

Amara, the lexicographer, in the *Vanauṣadhivarga* and the *Vaisyavarga* (enumeration of wild plants and of food-grains) gives some interesting particulars. (1) The trees (the flowering *Brikṣas* and the flowerless *vanaspatis*) are fruit-bearing, and possess woody stems काष्ठदारु or trunks (प्रकाण्ड—प्रकाण्ड: स्कन्ध: स्यान्मूलात् शाखाविस्तर:). Next come (2) arboraceous plants and shrubs (क्षुप, ह्रस्वशाखाशिफ: क्षुप:) bearing flowers as well as fruits. (3) The *latâs* are next noticed, flowering plants with herbaceous stems, some of them creeping on the ground (प्रतानिनी),

others succulent (गुल्मिनी), others twining or voluble (मूलाच्चाग्रं गता लता, वृक्षगामिनी लता—Amara. cf. Mukuta, तरुमूलात् प्रभृति वृक्षाग्रपर्य्यन्तं गता गुडूच्यादि लतापि अवरोहः—others call this शिफा). Cf. Susruta—लताः प्रतानवत्यः गुल्मिन्यश्च.

(4) Next come the *auṣadhis* (in the narrower sense), herbaceous plants, bearing fruit with or without flowers and dying or withering away after fructification. Some instances of *kandasâka* (tubers, rhizomes, corms) are noticed, *e.g.*, the *palându* (the onion पलाण्डुस्तु सुकन्दकः), the *lasuna* (garlic, महाकन्द), &c. But the graminaceae enumerated in the *Vaisyavarga* are the chief instances of the *auṣadhis*—plants that die after fructification. These are cultivated *auṣadhis*, but their affinities with the next class, the grasses (*Triṇas*), are also noted (*e.g.*, धान्यं व्रीहिः स्तम्बकरी । स्तम्बो गुच्छस्तृणादीनाम् । तृणधान्यानि नीवाराः । नाडी नालं च काण्डोऽस्य). Last are enumerated (5) the *Triṇas*, grasses, of which the characteristic is the formation of *gulmas*, (culms of grasses with annular knots from which leaves spring—स्तम्बो गुल्मे तृणादीनामकाण्डद्रुमगुच्छयोः). It is worthy of note that, in the enumeration of the grasses, the bamboo is considered as a sort of giant grass (तृणध्वज, grass flag, तृणेषु ध्वज इव). The reeds (नलादयः) are also placed among the grasses (नलादयस्तृणं गर्मुच्छ्यामाकप्रमुखमपि । प्रमुखशब्दात् नीवाराद्याः). (6) Finally, the Palmaceae (including the cocoanut, date, areca, and other palms) are classed as Tree grasses, probably because, like the grasses, they are endogens characterised by spikes and parallel veins. तृणद्रुमः। (तृणराजाह्वयस्तालः नारकेलस्तु लाङ्गली etc. एते च हिंताल सहितास्त्रयः खर्जुरः केतकी ताली खर्जुरी च तृणद्रुमाः—cf. also the *Râjanighantu*).

I may add that Amara places (7) parasitical plants among the *latâs*, (वन्दा वृक्षादनी । वृक्षरुहा । जीवन्तिकेत्यपि). They climb trees and feed upon them. These are to be distinguished from climbing plants, like the *guduchi* (Tinospora cordifolia), which have separate roots of their own. They are also to be distinguished from the adventitious roots descending from the branches of trees, like the Ficus religiosa, which are usually termed *avarohâs* (अवरोहाः).

The name *śiphâ* is ordinarily applied to the rootlets and suckers by which the tendrils of various creepers are attached to the soil. (शाखा शिफा अवरोहः स्यात् । वटादेः शाखायाः अवलम्बिनी शिफा । मूलाच्चाग्रं गता लता । मूलादूर्ध्वं गता लता स्यात् -Amara with Bhanuji Dikṣita's commentary. But the Mukuta notes :—तरुमूलात् प्रभृति वृक्षाग्रपर्य्यन्तंगता गुडूच्यादि लताऽपि अवरोहः । The *guduchi* is also called वत्सादनी, छिन्नरुहा)

The Hindu Materia Medica mentions *Âkâsavalli*, lit. sky-creeper, a name which seems to have been originally intended for some orchids; also *plava* (lit. floating), weeds that float in stagnant ponds, and Śaivâla, mosses and lichens. (*e.g.*, दूर्वाकसेरुप्लवशैवालं जलेन क्वथितं पीतं शुक्रमेहहरं -*Chakrapâṇi-Samgraha*, also *Bhâva-Prakâsa*). These are not classified, but like the mushrooms must come under the *Pâkaniṣṭha auṣadhis*, Ausadhis that die after maturing, without bringing forth flowers or fruits.

SECTION 2.

ELEMENTARY IDEAS OF PLANT PHYSIOLOGY.

Characteristics of plant life.

The *Nyâya-vindu-tikâ* of Dharmottara, the Buddhist Scholiast, notices the phenomenon of sleep (contraction of leaves in the night) in certain plants (स्वापः रात्रौ पत्रसङ्कोचः)

Udayâna notices in plants the phenomena of life, death, sleep, waking disease, drugging, transmission of specific characters by means of ova, movement towards what is favourable and away from what is unfavourable (वृक्षादयः प्रतिनियतभोक्त्रधिष्ठिताः जीवनमरणस्वप्नजागरणरोगभेषजप्रयोगबीजसजातीयानुबन्धानुकूलोपगमप्रतिकूलापगमादिभ्यः प्रसिद्धशरीरवत्—Udayâna, पृथिवी निरूपणम्). I may add that metaphors drawn from the heliotropic movements of the Suryyamukhi flower are among the stock-in-trade of Sanskrit poetry and belles-lettres.

The Jaina writer, *Gunaratna*, in his commentary on the *Shaddarśana-Samuchchaya* (circa 1350 A.D.), enumerates the following characteristics of the plant-life: (1) stages of infancy, youth and age, (2) regular growth, (3) various kinds of movements or action, connected with sleep, waking, expansion and contraction in response to touch, also movement towards a support or prop, (4) withering on wound or laceration of organs, (5) assimilation of food according to the nature of the soil, (6) growth or decay by assimilation of suitable or unsuitable food as prescribed in the science of the diseases of plants and their treatment (वृक्षायुर्वेद), (7) disease, (8) recovery from diseases or wounds by the application of drugs, (9) dryness or the opposite, due to the sap which answers to the chyle (रस) in animals, and (10) special food favourable to impregnation. (विशिष्टदोहृदादिमत्त्वं विशिष्टस्त्रीशरीरवत् यथा स्त्रीशरीरस्य तथाविधदोहृदपूरणात् पुत्रादिप्रसवनं तथा वनस्पतिशरीरस्यापि तत्पूरणात् पुष्पफलादिप्रसवनं) Even the Vanaspatis (flowerless, but fruit-bearing trees) may be made to flower (Cf. Vâraha-mihira's recipes for the treatment of plants for similar purposes).

(Cf. Gunaratna, *Tarkarahasyadîpikâ*, *Jainamálâ*, śloka 49).

Sankara Misra in the *Upaksâra* notes as an additional characteristic the growth of organs (or tissues) by natural recuperation after wound or laceration भग्नक्षतसंरोहणं च Upaskâra, Chap. IV, Ahnika 2, Sutra 5 S. B. H.Vol. vi).

Gunaratna gives a list of plants that exhibit the phenomena of sleep and waking:-- समीप्रपुन्नाटसिद्धेसरकासुन्दकबब्बूलागस्त्यामलकीकतिप्रभृतीनां स्वापविबोधतः - *ibid*). He also notices the sensitiveness to touch of plants like the *Mimosa pudica* लज्जावती लता, which show a manifest reaction in the form of contraction लज्जालूप्रभृतीनांहस्तादिसंसर्गात् यत्र सङ्कोचादिका परिस्फुटा क्रिया उपलभ्यते (*ibid*).

Sexuality.

Very vague ideas were entertained as to the sexual characters of plants. The pollen is called *Rajas*, *puṣpa*, *prasuna*, —names which are also applied to the female menstruum - and Amara expressly states that for females and flowers these elements (and the terms signifying them are the same स्त्रीणां सुमनसां पुष्पं प्रसूनं समम् Amara, *Vanauṣadhivarga*). Charaka (Dridhavala), indeed, distinguishes between the male and the female *vatsa* (or *kutaja*), considering the variety that bears white flowers and large fruits as male (बृहत्फलश्वेतपुष्पः पुमान् Holarrhena antidysenterica), and that which bears red or yellow flowers and small fruits as female श्यावारुणाल्पपुष्पी स्त्री—असित कूटज Wrightia tinctoria; Charaka, *Kalpasthâna*, (Chap. 5); but this is hopelessly wrong. Even these vague ideas were afterwards completely lost; and the *Râjanighantu* tells us of a grotesque division of plants into male, female and hermaphrodite, based on the slender or stout, the soft or hard, the long or short, the simple or mixed character of the stems and flowers! (*Râjanighantu*, अनूपादि प्रथमो वर्गः स्त्रीपुंनपुंसकत्वेन त्रैविध्यं स्थावरेष्वपि etc.)

Consciousness.

The Hindu Scriptures teach that plants have a sort of dormant or latent consciousness, and are capable of pleasure and pain (अन्तःसंज्ञा भवन्त्येते सुखदुःखसमन्विताः). Chakrapâni notes in the *Bhânumati* that the consciousness of plants is a sort of stupefied (darkened or comatose) consciouness (वृक्षास्तु चेतनावन्तोऽपि तमश्छन्नज्ञानतया शास्त्रोपदेशविषया एव)।

Udayâna also notes that plants have a dormant unmanifested consciousness which is extremely dull अतिमन्दान्तःसंज्ञितया, etc.)

The following ślokas from the Mahâbhârata may fitly conclude this section:

वन्यानामपि वृक्षाणामाकाशोऽस्ति न संशयः ।
तेषां पुष्पफलव्यक्तिर्नित्यं समुपपद्यते ॥
उष्मतो म्लायते पर्णं त्वक् फलं पुष्पमेव च ।
म्लायते शीर्य्यते चापि स्पर्शस्तेनात्र विद्यते ॥

वाय्वग्न्यशनि-निर्घोषैः फलं पुष्पं विशीर्य्यते ।
श्रोत्रेण गृह्यते शब्दस्तस्माच्छृण्वन्ति पादपाः ॥
वल्ली वेष्टयते वृक्षं सर्व्वतश्चैव गच्छति ।
नह्यद्रष्टुश्च मार्गोऽस्ति तस्मात् पश्यन्ति पादपाः ॥
पुण्या पुण्यैस्तथा गन्धैर्धूपैश्च विविधैरपि ।
अरोगाः पुष्पिताः सन्ति तस्माज्जिघ्रन्ति पादपाः ॥
पादैः सलिल-पानाच्च व्याधीनाञ्चापि दर्शनात् ।
व्याधिप्रतिक्रियत्वाच्च विद्यते रसनं द्रुमे ॥
वक्त्रेणोत्पलनालेन यथोर्द्ध्वं जलमाददेत् ।
तथा पवनसंयुक्तः पादैः पिबति पादपः ॥
सुखदुःखयोश्च ग्रहणात् छिन्नस्य च विरोहणात् ।
जीवं पश्यामि वृक्षाणामचैतन्यं न विद्यते ॥ शान्तिपर्व्व, महाभारत ।

APPENDIX B.

HINDU CLASSIFICATION OF ANIMALS.

SECTION 1.

CLASSIFICATION OF ANIMALS.

Charaka.

Charaka mentions four primary divisions :—

(1) *Jarâyuja*, born from the uterus, or rather, placentalia, viviparous (no a-placental mammals were known), *e.g.*, man, the quadrupeds, etc.

(2) *Andaja*, born of an ovum (egg), comprising fishes, reptiles and birds.

(3) *Svedaja* (or *Uṣmaja*) born of moisture and heat, spontaneously or a-sexually generated, *e.g.*, worms, mosquitoes, etc.

(4) *Udvijja*, born of vegetable organisms (भूतानां चतुर्विधा योनिर्भवति जरायवण्डस्वेदोद्भिदः—Sârîrasthâna, Chapter III) एकैका योनिः अपरिसंख्येयभेदा भवन्ति भूतानामाकृतिविशेषा परिसंख्येयत्वात् *Ibid.*

Prasastapâda.

Prasastapâda begins with two great divisions :—(1) Ayonija, animals that are a-sexually generated, of small dimensions (क्षुद्रजन्तु). (2) Yonija, sexually generated, *i.e.*, from the union of a sperm and a germ element. The latter are sub-divided into (*a*) *Jarâyuja*, lit., placentalia, viviparous (no a-placental mammals were known), and (*b*) *Andaja*, oviparous. Man, the quadrupeds, domesticated and wild, etc., are given as examples of viviparous animals ; and birds, *Sarisripas* (reptiles, etc.) of oviparous animals.

Udayana.

Udayana in the *Kiraṇâvali* notes that *Jarâyu* means the placenta (गर्भवेष्टनचर्म्मपुटकं जरायुः cf. Sridhara in the *Kandali*, जरायुरिति गर्भाशयस्य अभिधानं तेन वेष्टितं जायते इति जरायुजम्). Udayana adds that the term '*Sarisripa*,' includes insects and fishes as well as reptiles these being all oviparous (सरीसृपाः परितः प्रसर्पणशीलाः सर्पकीटमत्स्यादयः—पृथिवीनिरूपणम्).

Patanjali.

The a-sexually generated animals, as we have seen, are also called *Kṣudrajantus* (lit. small animals). Patanjali in the *Mahâbhâṣya* gives several alternative definitions (or descriptions) of this class of animals :—They are defined (1) as animals without bones अनस्थिकाः क्षुद्रजन्तवः or (2) as animals that do not possess any blood of their own येषां स्वं शोणितं नास्ति ते क्षुद्रजन्तवः or (3) as numbering more than a thousand in a palmful, *i.e.*, minute in size, or (4) as not easily crushed, or (5) as comprehending all animals up to the ichneumon (in the animal series) अथवा नकुलपर्य्यन्ता क्षुद्रजन्तवः—Mahâbhâṣya 2-4-1).

Susruta.

Susruta mentions four great divisions :—(1) *Sansvedaja*, born of moisture and heat. This division is mentioned first, as Dalvana notes, because moisture and heat are essential factors in the generation of all forms of animal life, including the classes that follow, (2) *Jarâyuja*, viviparous or placental, (3) *Andaja*, oviparous, and (4) *Udvijja*, bursting forth (from the ground or perhaps from some previous unmanifest shape, *e.g.*, frogs, coccidæ etc.) The second, third and fourth classes are mentioned in the order of their importance. Subsequently the order of enumeration is changed :—(1) *Jarâyuja*, (2) *Andaja*, (3) *Svedaja*, (4) *Udvijja*. One reading gives the order (1) Svedaja, (2) Andaja, (3) Udvijja and (4) Jarâyuja. Some commentators point out that the order in the text (whatever that may be) is intended to indicate the order of creation by Brahmâ.

Susruta mentions man, *Vyâla* (carnivorous quadrupeds) and *Pasu* (herbivorous quadrupeds) as examples of the viviparous; birds, snakes and *Sarisripas* as examples of the oviparous; *Krimis, Kîtas* and *Pipîlikâs* (worms, insects, ants, etc.) as examples of the moisture-born; and frogs and the coccidæ (the coccinella) as examples of the animals that 'burst forth' (eruptive or metamorphic ?)

Dalvana.

Dalvana notes that the divisions are really cross-divisions (योनिसंकर) and intended to be such, as the natural divisions of Jiva and species are not all exclusively oviparous or exclusively viviparous. For example, among birds (पक्षिणः winged animals), bats and *Valâkâs* are viviparous (बलाका जतुकादयः जरायुजाः). Indeed *Valâkâs* are some of them oviparous and some viviparous (पक्षिषु बलाका जरायुजा अण्डजाश्च). Among snakes, the *Ahipatâkâs*, a species of non-venomous colubrines snakes, are viviparous (ovo-viviparous ?). Among the moisture-born, there are some kinds of ants (पिपीलिकाः) which also lay eggs or burst forth (from the ground or perhaps from some previous unmanifest shape)—(स्वंस्वेदजेष्वपि काश्चित् पिपीलिका अण्डजा उद्भिजाश्च)

The oviparous animals are divided by Susruta into birds, snakes, *sarisripas*, etc. Dalvana notes that the *Sarisripas* include fishes, and *Makaras* (sea-fish with fierce teeth—हिंस्रदंष्ट्रकाः), and the 'et cetera' comprehends tortoises and crocodiles (सरीसृपाः शीघ्रगामिनः कृष्णसर्पादयो मीनमकरादयो वा प्रभृति ग्रहणेन कूर्म्मनक्रादीनां ग्रहणम्)! The 'moisture-born' are due to the moisture and heat either of the earth, or of organisms (स्वंस्वेदजाः भुवः शरीरस्य च संस्वेदात् उष्मणः जाताः). Of these, the *Krimis* (worms) arise from the moisture of the fæces in the bowels (कृमयः कोष्ठपुरीषादिवाष्पसम्भवाः—Dalvana), from putrefying dead bodies (शव Susruta;—cf. शरीरे कियद्द्वेलामन्तर समुत्पन्नानां कृम्यादीनां कथं चैतन्यम्—Guṇaratna, *Tarka-rahasya-dîpikâ*, (*Jainamatam*); from decomposing curd or milk (*e.g.*, वर्षासु च स्वेदादिना अनतिदवीयसैव कालेन दध्याद्यवयवा एव चलन्तः पूतनादिकृमिरूपा उपलभ्यन्ते —Jayanta, *Nyâyamanjarî*, *Ahnika* 7, भूतचैतन्यपक्ष).

The second class, *Kîtas*, noticed among the moisture-born, include the scorpions, the six-spotted venomous insect *ṣadvindu*, &c., (कीटाः वृश्चिकषड्विन्दु प्रभृतयः Dalvana). Of these the scorpions arise from cow-dung, excreta of snakes, rotten wood (कथं गोमयाद् वृश्चिकः जायते —Pâtanjali, Mahâbhâṣya 1-4-3) cf. also Susruta, *Kalpasthâna*, Chapter 7.

The third class, Pipilikâs, ants and the like insects, Dalvana notes, are born of moisture and heat, as well as of eggs, and sometimes burst forth from the ground (भुवमुद्भिद्य जाता उद्भिज्जा - Dalvana). The gnats and mosquitoes (दंशमशकादयः) are also usually placed among the moisture-born. An *anda* (egg) is described as oval, of the form of a *pesi* (muscle ?)—(अण्डं पेश्याकारवर्त्तुलं—Dalvana. Cf. Sridhara, Kundali, अण्डं बिम्बं तेन वेष्टितं जायते तत् अण्डजं, पृथिवीनिरूपणं)

Chhândogya and Sankara.

It may be noted that the *Chhândogya Upanisada* classifies animals on the basis of their *vija* (ovum or seed), as threefold :—(1) *Andaja*, born of eggs ; (2) *Jivaja*, viviparous ; and (3) *Udvijja*. Sankara explains that the udvijja animals arise from vegetable organisms (उद्भित् स्थावरं ततो जातम् उद्भिज्जम्) which is also Charaka's view, as we have seen. But unlike Charaka, Sankara holds that the *sveda a* animals must be included partly under the oviparous, and partly under the *udvijja* (vegetable-born) class (अण्डजोद्भिज्जयोरेव यथासम्भवमन्तर्भावः)- Chhândogya, Prapâthaka 6, Part 3).

Evidently the idea is that, though vegetable organisms may pass off into animal, there cannot be generation without *vija* (seed or ovum), and inorganic matter without *vija* (seed or ovum) cannot give rise to animal life. Pâtanjali, in the *Mahâbhâsya* (circa 150 B.C.) mentions the opposed view, which holds that not only animal organisms but also vegetable organisms, *e.g.*, grasses, grow from inorganic matter. The Durvâ grass, for example, can grow from deposits of the hair of goats and cows, just as scorpions are seen to develop out of cow-dung. Pâtanjali notes the orthodox Sânkhya-Vedânta explanation that these are not cases of growth (or transformation) but merely of coming out (अपक्रामन्ति) कथं गोमयाद् वृश्चिको जायते गोलोमाविलोमेभ्यः दूर्वा जायन्ते इति अपक्रामन्ति ता वस्तुभ्यः -Mahâbhâṣya. 1-4-3.

The Dietary Animals in Charaka and Susruta.

In noticing different kinds of meat for dietary purposes, Charaka gives a classification of animals (mammals and birds) which has only a practical (therapeutic) significance.

The dietic value of the flesh of any animal was conceived to depend mainly on its habitat and mode of life. Dietary animals (mammals and birds) were accordingly divided into eight classes (अष्टविधा योनिस्तेषाम्)

(1) *Prasaha*, carnivorous as well as non-carnivorous (Chakrapâṇi), comprehending land-quadrupeds and birds that fall on their food with force,

(2) *Anupa*, animals that live in marshy or water-logged lands or graze on river banks,

(3) *Bhusaya* or *Vilesaya*, animals that live in underground holes,

(4) *Vârisaya*, aquatic animals, both fresh-water and oceanic,

(5) *Jalachara*, amphibious animals,

(6) *Jângala*, animals that live in dry and elevated (hilly) jungle lands, mostly species of deer,

(7) *Viṣkira*, birds that scatter their food in picking up, and

(8) *Pratuda*, birds that pierce or torment their food (worms and fruits) with the beak.

In the chapter on articles of diet, Susruta gives a practical classification of (vertebrate) animals for dietary purposes. Animals that find a place in this dietary are first divided into two classes :—(I) *Anupa*, animals that live in marshy or water-logged land (or in water) ; (II) *Jângala*, animals that live in dry (hilly) jungle land. The Jângalas are divided into five classes, and the Anupas into eight. The thirteen classes are based on real and natural distinctions of food and habitat ; they are for dietary purposes arranged under six conventional (or artificial classes) (त्रयोदश भेदा षड्सु एव अन्तर्भूत । संख्येयम् । निर्द्दे शादेव षड्संख्यायां लब्धायां षड्ग्रहणम् तेन षड्वर्गा इति नियमार्थम्—Dalvana, Sutrasthâna Chapter 27). These thirteen classes of dietary animals may be enumerated as follows :—

I. *Jângala* animals—*Janghâla*, *Viṣkira*, *Pratuda*, *Guhâsaya*, *Prasaha*, *Parṇamriga*, *Vilesaya* and *Grâmya*, and

II. *Anupa* animals—*Kulechara*, *Plava*, *Kośastha*, *Pâdina* and *Matsya*.

Of those, the *matsyas* (fishes) are divided into two groups, freshwater (lit. river-water) and sea-water fishes. Among the sea-fishes, the Timi and the Timingala (cod-fish or whales ? तिमिमहत्तमो मत्स्य: तिमिङ्गलस्ततोऽपि महत्तम: --Dalvana) find a place, as also the *makara*, (shark—हिंस्रदंष्ट्राक: —Dalvana).

The *kosastha* (living in shells-mollusca) are distinguished from the *matsyas* (fishes). In this class are enumerated *sankhas* (conchifora), *sankhana* (smaller conchifera), *sukti* (pearl mussels), *sambuka* (Helix) with spinal shell (आवर्त्तकोश: Dalvana,) *valluka* (a species of Helix, according to some (सन्ने सम्बुक भेद्भापु: Dalvana), etc. Dalvana adds *vodika*, *jalasukti*, and various species of Helix (वोड्डिकजलशुक्तिशम्बूकभेदा बहुविधा गृह्यन्ते)

The *pâdinas*, aquatic animals having pedal (or long dorsal) appendages, comprise the *kurmas* (oval or oblong-shaped tortoises, turtles), the *kumbhiras* (crocodiles, emydosauria, reptilia), the *karkatas* (white and black crabs, crustacea), the *sisumara* (a species of the Delphinidæ cetacea) muscular, with a sharp protruding snout, breathing with the blow-hole *out of the water*, probably a dolphin, as the long dorsal fin was taken for a sort of pedal appendage (दंहाकारोर्द्ध्वं वक्त्र: वहिर्निश्वासं मुञ्चति सोऽपि द्विविध: वर्त्तुलदीर्घभेदेन —Dalvana). The *pâdinas* do not represent any natural division.

Of the other *Anupa* animals (aquatic or amphibious animals), the *plavas* (lit., floating on the water) represent a class of birds (the Natatores and the Grallatores) exemplified by geese, ducks, cranes, &c.

The *Kulecharas* are herbivorous quadrupeds that frequent the banks of rivers and ponds, and comprise the elephant, the rhinoceros, the *Gavaya* (*Bos gaveus*), the buffalo, various species of deer, &c.

Of the land-animals (*Jângala*), three of the sub-divisions represent birds, and five, mammals. The Land-Birds are (1) the *Prasaha* birds, birds of prey proper (Raptores), comprising the vultures, kites, hawks, owls, &c. (Charaka's *Prasaha* is a much wider class) (2) the *Vishkiras*, birds that scatter their food in picking up, and (3) the *Pratudas*, birds that pierce or torment their food (fruits or worms) with the beak. The last two classes comprehend between them the *Passeres* (proper and so-called), the *Scansores*, the *Rasores* and the *columbæ*.

The remaining five classes of *Jàngala* animals are mammals, with the exception of several species of *Vilesayas*, which are reptiles. The *Parṇamrigas* (arboreal animals) comprise the apes, sloths, squirrels, as also some of the reptiles and carnivora. Among the *Parṇamrigas*, the *Putighasa* is a kind of tree-cat giving out a pungent odour ; the *madgumuṣika* and the *Brikṣasâyika*, are arboreal rodents ; and the *Arâkusha*, is a species of cow-tailed monkey (*vide* Dalvana). The *Janghâlas* are wild animals, herbivorous quadrupeds that are strong-legged and quick-footed, comprising various species of deer and antelopes.

The *Grámyas* (lit., living in or about villages, domesticated quadrupeds) comprise the horse, the mule, the ass, the camel, the goat, the sheep, &c. They are non-carnivorous, being distinguished from the carnivorous quadrupeds (क्रव्याद—Susruta, मांसाद Charaka). Some are *Ekasapha* (animals whose hoofs are not cloven) (ग्राम्यशब्देन च एकशफशब्देन च ग्राम्या: --शफ: खुर:-- Dalvana).

The *Guhâsayas* are carnivorous quadrupeds (क्रव्यादा:) living in natural caves or hollows. They comprise the lion, the tiger, the wolf, the hyena, the bear, the panther, the cat, the jackal, the *mrigevaru*, &c. The *vrika* (wolf) is defined as a dog-like animal, small-sized (in comparison with the lion and the tiger). By the cat, here, wild cats are meant. The *mrigevaru* is described as a jackal-like animal that kills deer.

Finally come the *Vilesayas*, animals that live in holes or burrow, comprising various species of Rodents and Insectivora, and several species of Reptiles.

Snakes in Nâgârjuna.

The Snakes (ophidæ) are especially noticed by Susruta. (Nâgârjuna in the chapters relating to Toxicology. *Kalpasthâna*, Chapter 4). Five different genera or families are noticed, of which one is non-venomous, and four venomous, including one hybrid and three pure or unmixed families. Of the last, (1) the *Darvikaras* (कृष्णसर्प महाकृष्ण, पद्म, महापद्म, शङ्खपाली.—Tripudians, Naia Bungarus, Colubridæ) are *hooded, swift in their movements, diurnal in their habits*, and bear on their hoods or their bodies the marks of chariot wheels, ploughs, umbrellas, rhombs or cross-bands, goads, &c. (2) The *mandali* (Vipera and Trimeresums, Viperidæ ?) are thick (पृथव:), slow-moving, nocturnal in their habits, and bear circles or rings on the body (आदर्शमण्डल). Charaka adds that they are without hoods. (3) *Ragimats* also are without hoods and nocturnal, and bear series of dots or marks, and are often of variegated colours on the upper parts and sides (Colubridæ, Bungarus Callophis, Dryophis, &c., ?). Twenty-six varieties are named of the first, two of the second, and ten of the third.

Of the *Nirviṣas*, non-venomous snakes, twelve varieties are mentioned, including Boidæ अजगर and the columbrine Dendrophis, (वृक्षेशय.) Of the *Vaikaraṇya* (hybrid) snakes, there are ten varieties, of which three are produced by the union of certain venomous species, and seven are secondary derivative forms.

The *Danikaras* are most deadly when young, the *Mandalis* when middle-aged, the *Ragimats*, when aged. Their poisons act differently, and an elaborate description is given of the action of the venom of each of the three venomous families.

Snakes in the Purâṇas.

The *Bhaviṣya Purâṇa* gives the following additional information. The *Nâgas* (Naiæ, Colubridæ, Snakes) copulate in the month of *Jyaistha* or Âṣâḍha (May or June), gestate during the rainy months that follow, and bring forth about two hundred and forty eggs in the month of *Kârtika* (November). Most of these are devoured by the parents, but those that are left break forth from the shell in about two months (or one month, according to the *Agnipurâṇa*).

Eggs of a golden hue like that of the (red) flowers of the *Calotropis gigantea* (सुवर्णार्कवर्णनिभ) produce male young ones, those somewhat paler and of an elongated ovoid shape (अर्कोदकसुवर्णाभात् दीर्घराजीवसन्निभात् bring forth female snakes, and those of the hue of the *Siriṣa* blossom hermaphrodite ones. By the seventh day the young snakes turn dark; in a fortnight (or twenty days, according to another account) the teeth come out. The poison is formed in the fangs (दंष्ट्रासु) in three weeks, and becomes deadly in the twenty-fifth night. In six months, *Nâgas* shed the skin (कञ्चुक).

In moving on the ground, the folds of the skin on the under-surface alternately expand and contract, appearing to put out and draw in fine filament-like legs, about 240 in number. The joints on the skin (scabs or scutes—सन्धय:) are two hundred and forty in number (perhaps the sub-caudals were not counted).

Snakes are killed by men, mungooses, peacocks, *Chakoras* (a kind of partridge), scorpions, boars, cats, and the hoofs of oxen. Escaping death from these enemies, a

Nâga may live for a hundred and twenty years. The term of life of the non-venomous snake is shorter, about seventy-five years. (*Bhavisya Purâṇa* पञ्चमीकल्प).

The *Agnipurâṇa* gives the total number of teeth (of a Nâga) as thirty-two; of which four (two on either side) are venomous; *viz.*, *Kâlarâtri* and *Yamadutikâ*, which appear to be the names of the fangs, and *Karâli* and *Makari* which seem to stand for two hard (maxillary) teeth accompanying the two fangs (cf. also Charaka—Dridhavala, *Chikitsâsthâna*, XXIII, विषचि कित्सितम्).

Umâsvati's Classification of Animals.

A more thorough classification of animals is found in the ancient Jaina work, the *Tattwârthâdhigama* of Umâsvati, which the Jaina chronological lists enable us to assign with great probability to the fourth or fifth decennium after Christ (circa 40 A.D). Umâsvati's classification is a good instance of classification by series, the number of senses possessed by the animal being taken to determine its place in the series. Perhaps only senses actively determining the life-habits were counted.

I. First come animals with two senses, *viz.*, touch (as evidenced by contractility of tissue) and taste (as involved in the selection and rejection of food). This division comprises—

(*a*) *Apâdika* (Vermes without lateral appendages, Scolecids).

(*b*) *Nupuraka* (Ring-like, with pendants, vermes with unsegmented lateral appendages, Annelids).

(*c*) *Gandupâda* (Knotty-legged, Arthropoda, including Crustacea, Myriapoda, &c).

(*d*) Some forms of Mollusca, *e.g.*, *Sankha* (Conchifera, Lamellia branchiata), *Suktika* (Pearl-mussel, Lamellia branchiata), and *Sambuka* (Helix).

(*e*) *Jalukâ*, Leeches (Annelids).

II. Next come the animals with three senses, namely, smell in addition to the primordial senses of touch and taste involved in the contraction of tissues and the appropriation of food. Here also well-developed and active senses alone were perhaps intended. Rudimentary or dormant senses were not reckoned. This division comprises—

(*a*) *Pipîlikâ* (Ants, Formicidae, Hymenoptera).

(*b*) *Rohinikâ*, red ants (Formicidae, Hymenoptera).

(*c*) *Upachikâ*, *Kunthu*, *Tuburaka*, bugs and fleas (Hemiptera, Hemimetabola).

(*d*) *Trapusavija* and *Karpâsasthika*, cucumber and cotton weasels and lice (Aptera, Ametabola).

e) *Satapadi* and *Utpataka*, Spring-tails (Aptera, Ametabola).

(*f*) *Triṇapatra*, Plant lice.

(*g*) *Kâstha-hâraka*, Termites, white ants (*Neuroptera*, *Hemi-metabola*).

III.—Then come the animals with four well-developed and active senses, *i.e.*, sight, smell, taste and touch.

This division comprises -

(*a*) *Bhramara*, *Varata*, and *Sâranga*—Bees, Wasps and Hornets (Hymenoptera, Holometabola).

(*b*) Makṣikâ, Puttikâ, Dansa and Masaka—Flies, Gnats, Gadflies and Mosquitoes (Diptera, Holometabola).

(c) Vrischika and Nandyavarta—Scorpions and Spiders (Arachnida, Arthropoda).

(d) Kita—Butterflies and Moths (Lepidoptera, Holometabola), and

(e) Patanga—Grasshoppers and Locusts (Orthoptera, Hemimetabola.)

IV.—Finally come the animals (man and the Tiryyak-yonis) with five well-developed and active senses. Omitting man, this division comprises—

(*a*) Matsya, fishes,
(*b*) Uraga,
(*c*) Bhujanga,
(*d*) Pakṣi, birds, and
(*e*) Chatuṣpada, quadrupeds.

Uraga and Bhujanga in popular use mean reptiles ; but here evidently Bhujanga is taken to mean oviparous limbed animals (limbed reptiles and batrachians) and not creatures whose movements are crooked or in the form of a bent bow; and Uraga stands for apodal reptiles including snakes (ophidæ).

It will be seen that the first three divisions fall under the Invertebrata, and the fourth is identical with the Vertebrata.

This last division (the Vertebrata) is sub-divided on a different basis, *viz.*, the mode of reproduction. The sub-divisions are three :—

A.—*Andaja*, oviparous (Pisces, Reptilia and Batrachia), *e.g.*, *Sarpa* (Snakes, Ophidia, Reptilia), *Godha* (Varanidæ, Lizards, Reptilia), *Krikalâsa* (Chameleons, Reptilia), *Griha-golika* (Common Lizards—Lacertilia), Matsya (Pisces) *Kurma* (Tortoises—Chelonia, Reptilia), *Nakra* (Crocodiles, Reptilia), *Sisumvira* (Dolphin or Porpoise, Cetacea) and Birds proper with feather wings—the *Lomapakṣa pakṣis*.

Porpoises are erroneously put here being really viviparous like other cetacea. Frogs are not mentioned in this list. The omission is strange. Perhaps (as in Susruta) frogs were believed to be *Udvijja* (eruptive or metamorphic) and not *Andaja* (oviparous). But Susruta mentions the frogs after the quadrupodal and centipedal Reptilia (*Kanava*, *Godheraka*, *Galagolika* and *Satapadi*).

B.—*Jarâyuja*, mammals born with placenta, including all mammals other than the *Potaja*. (Here *Jarâyuja* is used in a restricted sense) :—(1) Man, (2) Cow, (3) Buffalo, (4) Goat and Sheep, (5) Horse, (6) Ass, (7) Camel, (8) Deer, (9) Yak (*Chamara*), (10) Hog, (11) Bos Gavæus (Gâveya)—Ungulata, (12) Lion, (13) Tiger, (14) Bear, (15) Panther, (16) Dog, (17) Jackal, (18) Cat (Carnivora), etc.

The apes, though not expressly mentioned, are also to be included.

C.—*Potaja*, a class of placental mammals comprising the Deciduata with the exception of Man, the Apes and the Carnivora :—*e.g.* *Sallaka* (Porcupine, Rodentia), *Hasti* (Elephant, Proboscidea), *Sravit* and *Lâpaka* (Hedgehogs and other creatures that lap up, Insectivora), *Sasa* and *Sayika* (Hare, Rabbits and Squirrel, Rodentia), *Nakula* (Ichneumon, which though carnivorous is supposed to come under the Deciduata), *Muṣik* (Mice, Rodentia) and the *Charma pakṣa Pakṣis*, so-called birds with leathern wings (Bats, Chiroptera), *e. g.*, *Valguli* (Flying Fox), *Pakṣivirâla* (Flying Cat, Micro-Chiroptera) and *Jalukâ* (apparently meaning blood-sucking Bats or Vampires, though these are scarcely found in the old world).

The *Potaja* class thus comprises the following Deciduata :—Proboscidea, Rodentia, Insectivora and Chiroptera.

The term *Potaja* is intended to signify that these animals are born without the placenta which is thrown off as an after-birth, whereas such of the *Jarâyujas* as are not *Potajas* are born with the placenta attached to the embryo. But it is not easy to explain why man, the Apes and the Carnivora should not also be reckoned among the *Potajas*.

कृम्यादीनां पिपीलिकादीनां भ्रमरादीनां मनुष्यादीनां च यथासंख्यमेकैकवृद्धानि इन्द्रियाणि

भवन्ति । यथाक्रमम् । तद् यथा कृम्यादीनां अपादिक-नूपुरक-गण्डूपद-शङ्ख-शुक्तिक-शम्बूक-जलूका-प्रभृतीनां स्पर्शनरसनेन्द्रिये भवतः । पिपीलिका रोहिणिका-उपचिका-कुन्थुतुवुरक-त्रपुसबीज-कर्पासास्थिका-शतपद्युत्पतक-तृणपत्र-काष्ठहारक-प्रभृतीनां त्रीणि स्पर्शनरसनघ्राणानि । भ्रमर-वरट-सारङ्ग-मक्षिकापुत्तिका-दंश-मशक-वृश्चिक-नन्द्यावर्त्त-कीट-पतङ्गादीनां चत्वारि स्पर्शनरसनघ्राण चक्षूंषि । शेषानां च तिर्य्यग्-योनिजानां मत्स्योरगभुजङ्गपक्षि-चतुष्पदानां सर्वेषां च नारकमनुष्यदेवानां पञ्चेन्द्रियाणि । (Umâsvati, Tattvarthâdhigaṇa, Chap. II, Sutra 21).

जरायुजानां मनुष्य-गो-महिषाजाविकाश्व-खरोष्ट्र-मृग-चमर-वराह-गवय-सिंह-व्याघ्रर्क्ष-द्वीपि-श्व-शृगाल-मार्जारादीनाम् । अण्डजानां सर्प-गोधा-कृकलास-गृहगोलिका-मत्स्य-कूर्म्म-नक्र-शिशुमारादीनाम् । पक्षिणां च लोमपक्षाणां-हंस-चाष-शुक-गृध्र-श्येन-पारावत-काक-मयूर-मद्गु-बक-बलाकादीनाम् । पोतजानां शल्लक-हस्ति-श्वाविल्लायक-शश-शायिका-नकुल-मूषिकादीनाम् चर्मपक्षिणां च पक्षाणां जलूका-वल्गुलि-भारण्ड-पक्षिविरालादीनां गर्भोजन्म । (Umâsvati, *ibid*, Chap. II, Sutra 34)·

SECTION 2.

RE-CAPITULATION.

The ancient Hindu classification of animals, as gathered from the authorities mentioned above, may be briefly summarised thus :-

A.—*Kṣudrajantus*, boneless and without (red) blood. Invertebrata, divided into

(*a*) *Ayonija*, a-sexually generated, *e.g.*, the *Svedaja*, born of moisture and heat, and the *Udvijja* (vegetable-born, *e.g.*, the coccinella) and

(*b*) *Yonija*, sexually generated, *e.g.*, the *Andaja*, oviparous.

But some are both a-sexually and sexually generated, being both *Svedajas* and *Andajas*, or *Udvijjas* and *Andajas*.

The *Kṣudrajantus* (Invertebrata) comprise—

(I) the *Krimis* vermes : (*a*) *Apidikas* without lateral appendages (cf. Scolecids), (*b*) *Nupurakas*, Annelids (a section), (*c*) *Gandupadas*, Arthropoda (a section).

(II) the *Jalukâs*, Leeches, of which twelve species are described, six venomous, and six innocuous (cf. Susruta's careful description, *Sutrasthâna*, Chap. 13),

(III) *Kosasthas*, shelled animals, some forms of mollusca, *e.g.*, the *Sankhas* (Conchifera), the *Suktikas* (Pearl-mussels), the *Sambukas* (spiral-shelled, Helix), the *Vodikas*, etc.,

(IV) then the Insects typified by the Ants comprising

- (*a*) *Pipilikâ*, *Rohiṇikâ* (Ants, Hymenoptera).
- (*b*) *Upachikâ*, *Kunthu*, *Tuburaka* (bugs and flies, Hemiptera).
- (*c*) Cucumber and cotton lice (Aptera).
- (*d*) *Satapadi*, *Utpataka* (Spring tails, Aptera).
- (*e*) *Triṇapatra*, grass or plant lice (Aptera).
- (*f*) *Termites* (Neuroptera).

(V) Insects typified by the Hexopoda comprising—

- (*a*) *Bhramara*, *Varata*, *Sârangа*, Bees, wasps and hornets,
- (*b*) *Makṣikâ*, *Puttikâ*, *Dansa*, *Masaka*, Flies, gnats, gadflies, and mosquitoes,
- (*c*) *Vrischika* and *Nandyâvarta*, Scorpions and spiders (Arachnida, Arthropoda),
- (*d*) *Kita*, Butterflies and moths, and
- (*e*) *Patanga*, Grasshoppers and locusts.

Susruta-Nâgârjuna names six varieties of ants, six varieties of flies, five of mosquitoes, (including one marine and one mountain kind), eight varieties of *Satapadis* (centipedes), thirty varieties of scorpions and sixteen of spiders (Lutâs). Of the *Kitas*, the glow-worm and the *Tailakita* (lit., oil-worm) are said to be luminous (phosphorescent, (cf. *Rájanighantu* खद्योततैलकीटौ).

B.—The *Tiryyakyoni* animals, sexually generated animals other than such of the ovipara as are included under the *Ksudrajantu*, in other words, sexually generated animals possessing bones and blood—corresponding to the vertebrata—comprise the following classes:—

I. *Andaja*, oviparous :—

(*a*) The *Matsyas*, fishes, divided into river-water fishes and sea-fishes. Susruta names eleven species of the latter. The '*Timi*' (cod-fish, whale) is reckoned as a sea-fish. The *Makara* (shark) is also mentioned, but the *Kurmas*, *Kumbhiras* and *Sisumáras* (tortoises, crocodiles, and dolphins) are excluded from the class, as also the so-called shell-fish, being placed among the *Pádinas* and the *Kosasthas* respectively.

(*b*) The *Uragas*, apodal reptiles :—including the Sarpas (snakes, ophidia). Five classes of snakes are mentioned, one non-venomous, three venomous, and one hybrid. Eighty varieties of snakes are named, but the classification is based on superficial characters, *e.g.*, markings on the scales, etc., and do not touch any anatomical peculiarities. The pathological observations regarding the distinct action of the poisons of different orders seem to be good.

(*c*) *Bhujangas*, oviparous animals with lateral, pedal appendages, both Reptiles and Batrachians. Many of these are quadrupedal and five-clawed चतुष्पादाः कीटाः पञ्चनखाः (Dalvana.)

Illustrations.

1. *Godha*, *Grihagolika* and *Krikalasa* (Varantas lizards, common lizards and chameleons). Susruta names four varieties of the *Kanava*, a species of chameleon-like lizards—(cf. Ladyayana quoted by Dalvana, *Kalpasthána*, Chapter 8), also six varieties of *Galagolika* a species of lizards), and five varieties of *Godheraka*, Varanus-like lizards, but smaller in size.
2. *Kurmas* and *Nakras*, tortoises and Crocodiles (Chelonia and Emydosauria, Reptilia). Some species of the former are oval, others elongated (वर्त्तुलदीर्घादिभेदाः)
3. *Sisumáras*, the Delphinidæ (Odontocete cetacea).

Susruta mentions the frogs (*Udvijja*, eruptive or metamorphic ?) after the quadrupedal and centipedal Reptilia (*Kanava*, *Godheraka*, *Galagolika* and *Satapadi*). Eight species of frogs are named. The frogs are explained by the mythologist to have arisen from dirty water in the rainy season, ... प्रावृट्काले ततः (*i.e.* महेश्वरशुक्रात्) मण्डोदके जाता · cf. Dalvana, *Kalpasthána*, Chapter 8.

Susruta's *Pádinas* (aquatic animals having pedal or long dorsal appendages) are a conventional class formed for practical dietary purposes, and include (2) and (3) and also the Karkatas, crabs, (crustacea). *Umásvati's* Bhujanga class, being a natural sub-division of vertebrates, does not include crustacea which are rightly placed among the invertebrates.

(*d*) *Lomapakṣa pakṣi*, winged animals with feathery wings, Birds proper. These are oviparous, while the winged animals with leather wings (चर्म्मपक्षपक्षिणः) are placentalia of the Deciduata class (पोतजाः)

The Birds proper are divided into four classes :—

(1) *Plavas*, aquatic or amphibious birds, comprising the Natatores and the Grallatores. Various species are described.

(2) *Viṣkiras*, those that scatter their food in picking up.

(3) *Pratudas*, those that pierce or torment their food (fruits or grains).

The enumeration of the species under (2) and (3) shows that these two classes included the Passeres (veræ and so-called), the Scansores, the Rasores and the Columbæ.

(4) *Prasahas*, birds of prey proper (Raptores).

Dalvana's descriptions of deer and birds are precise, turning upon coloration, habits of life etc., *e.g.*, the descriptions of the Ruru, the Kârandava, and the Kanka, expressly quoted from some (unnamed) Hand-books :—

कूलचरमाह...रुरुः शरदि शृङ्गत्यागी । तल्लक्षणं उच्यते—

"विकटबहुविषाणः शम्बराकारदेहः सलिलतटचरित्वात् सङ्करेभ्यः विचित्रः । त्यजति शरदि शृङ्गं रौति"—इत्यसौ रुरुः स्यात् ।

कारण्डवः शुक्लहंसभेदोऽल्पः अन्ये करहरमाहुः । उक्तश्च कारण्डवः "काकवक्त्रो दीर्घाङ्घ्रिः कृष्णवर्णभाक्" इति ।

प्रसहानाह...कङ्कः दीर्घचञ्चुर्महाप्राणः । उक्तं च "कङ्कःस्यात् कङ्क मल्लाख्यो बाणपत्त्राहंपत्त्रकः । लोहपृष्ठो दीर्घपादः पक्षाधः पाण्डुवर्णभाक् ।" इति ।

The sources from which Dalvana derives detailed information about these varied forms of animal life are now unavailable, but these extracts abundantly testify to the minute nature study of the Hindus.

The Hindus had of course no idea of an anatomical classification of birds.

The ancient writer, Lâdyâyana, had a much better idea of zoological description in reference to the *Kîtas* (insects and reptiles, *vide infra*).

II.—*Jarâyujas*, (viviparous, lit., placentalia) in the usual wider sense ; comprising—

(*a*) *Charmapakṣa pakṣis*,—leather-winged animals, which are deciduata (*Potaja*) Charaka calls them *Mrigapakṣina* (mammal birds) and distinguishes them from the birds-of-prey proper, in his enumeration of the *Prasahas* (*Sutrasthâna*, Chapter 27). The Bats mentioned are :—

(1) *Valguli*, (flying fox),

(2) The *Pakṣi Virâla*, (flying cat, micro-chiroptera),

(3) The *Bharanda*, (a species of micro-chiroptera, the horse-shoe bat ?)

(4) The *Jalukâ*, (lit., aquatic or amphibious or more probably leech, bat, blood-sucking or vampire bat ?). These are placed among carnivorous animals.

(*b*) The *Vilesaya Jarâyujas*, mammals that live in holes or burrows, including various species of Rodents and Insectivora, which are named. Eighteen different varieties of mice are specified (Susruta, *Kalpasthâna*, Chapter 6).

(*c*) *Parnamrigas*, arboreal mammals, comprising some Rodents (squirrels etc.), a wild cat, the sloths and the apes (वानर).

(*d*) Non-carnivorous Quadrupeds (

(1 *Janghâlas*, lit., strong-legged quadrupeds, frequenting hilly and jungly tracts, comprising various species of deer (non-carnivorous wild animals, अक्रव्याद्).

(2) *Kulechara* mammals, grazing on the banks of rivers, and frequenting marshy places, comprising the elephant, the rhinoceros, the gaveya (Bos gavæus) the buffalo, the hog and also several species of deer (which live in well watered lands). These are also non-carnivorous (अक्रव्याद्)

(3) *Grâmyas*, (lit., living in or near villages), non-carnivorous domesticated quadrupeds, some with undivided hoof, others with cloven hoof,—comprising the horse, the mule, the ass, the camel, the cow, the goat, the sheep, etc. These are all non-carnivorous. The dog and the cat are not mentioned in the list.

(*e*) Carnivorous quadrupeds, *Guhâsaya* (living in natural caves or hollows[illegible]carnivorous *Kravyâda*),—comprising the lion, the tiger, the wolf (of the d[illegible]class), the hyena, the bear, the panther, the cat, the jackal, etc. The carnivora were, termed *Vyâlas* or *Kravyâdas*, and the herbi-vora *Pasus* (in a wider sense).

(*f*) Man.

The term *Jarâyuja*, in a wider sense came to mean 'viviparous' and included the above orders of animals. But the Jainas used the term *Jarâyuja* in a narrower sense to mean only those viviparous animals which come out at birth with the placenta (a-deciduata). The deciduata (including the Proboscidea, the Rodentia, the Insectivora, the Chiroptera, etc.) were termed, *Potaja*, lit., viviparous animals born without placenta. Man, the apes and the carnivora are, however, reckoned with the *Jarâyuja* (viviparous, born with placenta). Perhaps the after-birth was observed in these cases, whereas the *Potajas* (deciduata) may have been erroneously conceived to throw off no placenta.

Lâdyâyana appears to have made a special study of the classification of *kitas* (Insects and Reptiles) and is quoted by Dalvana as a great authority on the subject.

The various forms (रूप) of *kitas* are to be distinguished from one another by peculiarities in the following marks :—

(1) Dottings or markings, (2) wings, (3) pedal appendages, (4) mouth, with antennæ or nippers,—मुखसन्दंश, Dalvana, (5) claws, (6) sharp, pointed, hairs or filaments (7) stings in the tails, (8) hymenopterous character (संश्लिष्टैः पक्षरोमभिः) (9) humming or other noise, (10) size, (11) structure of the body, (12) sexual organs (this is how I interpret *linga* here), and (13) poison and its action on bodies.

cf. कटुभिः बिन्दुलेखाभिः पक्षैः पादैः मुखैः नखैः
शूकैः कण्टकलांगलैः संश्लिष्टैः पक्षरोमभिः ।
स्वनैः प्रमाणैः संस्थानै लिङ्गैश्चापि शरीरगैः
विषवीर्य्यैश्च कीटानां रूपज्ञानं विभाव्यते ॥

Quoted from Lâdyâyana by Dalvana, *Kalpasthâna*, chapter 8).

APPENDIX C.

HINDU PHYSIOLOGY AND BIOLOGY.

SECTION I.

METABOLISM.[1]

The food that we eat contains five classes of organic compounds. From their radicles or predominant elements, the substances are named Earth-compounds, *Ap*-compounds, *Tejas*-compounds, Vâyu-compounds and Âkâsa-compounds. The Earth-compounds supply the hard formed matter of the body, the Tejas-compounds give the animal heat (or the metabolic heat), the Vâyu-compounds are the sources of the motor-force in the organism, the Ap-compounds furnish the watery parts of the organic fluids, and the Âkâsa-compounds contribute to the finer etheric essence which is the vehicle of the conscious life.

Roughly speaking, the Earth-compounds answer to the nitrogen compounds in the food, the Tejas-compounds to the hydro-carbons (heat-producing), and the Vâyu-compounds to the carbo-hydrates (dynamic). The Ap-compounds are the watery parts of food and drink. The flesh, for example, is a tissue composed principally of the Earth-compounds, the fat of the Earth and Ap-compounds, the bones of earth, Vâyu and Tejas compounds. Different operations of the metabolic heat (perhaps different digestive fluids are also meant) are required to digest the different substances in the food.

The course of metabolism is described as follows: The entire alimentary canal is called the Mahâsrotas (the great channel).

The food goes down the gullet by the action of the bio-motor force, the *Prâṇa-Vâyu*.

In the stomach (आमाशय) the food becomes mixed up, first with a gelatinous mucus (फेणीभूतं कफं) which has a saccharine taste, and then gets acidulated by the further chemical action of a digestive juice (विदाहादम्लतां गतः -- evidently the gastric juice is meant). Then the bio-motor force, the *Samâna Vâyu*, begins to act and drives down the chyme, by means of the *Grahaṇi Nâḍi* to the *Pittâśaya* (duodenum, lit. bile-receptacle) and thence to the small intestines (the आमपक्वाशय). In these, the bile (or rather the digestive substance in the bile, as opposed to the colouring element) acts on the chyme and converts the latter into chyle (रस), which has at first a *kaṭu* taste (pungency). This chyle contains in a decomposed and metamorphosed condition all the organic compounds, *viz.*, tissue-producing Earth-compounds, water-parts or Ap-compounds, heat-producing Tejas-compounds, force-producing Vâyu-compounds, and, lastly, finer etheric constituents which serve as the vehicle of consciousness. The essence of chyle (सूक्ष्मभाग) from the small intestines is driven by the bio-motor force, the *Prâṇa Vâyu*, along a Dhamani trunk (cf. the thoracic duct) first to the heart (which is a great receptacle of chyle), and thence to the liver (and the spleen); and in the liver, the colouring substance in the bile acts on the essence of chyle, especially on the Tejas-substance therein, and imparts to it a red pigment, transforming it into blood. But the grosser part of chyle (स्थूल भाग) proceeds along the Dhamanís, being driven by the bio-motor force, the *Vyâna Vâyu*, all over the body.

When the blood has been formed, the essence of chyle in the blood, acted on by Vâyu (bio-motor force) and Mâmsâgni (the flesh-forming metabolic heat), forms the flesh-tissue, the Earth-compound of the food substance especially contributing to this tissue. Of the flesh-tissue thus formed, the grosser part goes to feed or replenish the flesh-tissue all over the body. The finer essence of flesh in the blood in the chyle, acted on again by Vâyu (bio-motor current) and the fat-forming metabolic heat (मेदोऽग्नि) in the menstruum of lymph (कफं समाश्रित्य), receives viscosity and whiteness, and produces the fatty tissue, the Earth-compounds and Ap-compounds of the food specially contributing to the product. This fat in the chyle (or blood), or rather the grosser part of it, replenishes the fatty tissue of the body, but the finer essence of fat *in* the flesh *in* the blood *in* the chyle, acted on by *Vâyu* (bio-motor current) and the marrow-forming metabolic heat, in the menstruum of lymph (श्लेष्मणावृत), becomes hard (crystalline), and forms bone, the Earth, Vâyu and Tejas compounds contributing principally to the product. The essence of the fat fills the hollow channels of the bones, and acted on again by bio-motor *Vâyu* and metabolic heat, becomes transformed into marrow. The marrow is similarly transformed into the semen, which is conveyed down by means of a pair of *Dhamanis* or ducts (द्वे शुक्रवहे), lodged in its receptacles (शुक्रधरा - वृषणौ) and discharged by means of another pair of ducts (द्वे विसर्गाय). The semen or rather all the elements in their finer essence, give off *ojas* which returns to the heart, the receptacle of chyle and blood, and again floods the body, and sustains the tissues, thus completing the wheel or self-returning circle of metabolism (परिवृत्तिस्तु चक्रवत् cf. Charaka and Vâgbhata).

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[1] Extract from my monograph in Dr. Ray's *Hindu Chemistry* Vol. II.

It is to be noted that, throughout, the fluid in the chyle or blood acts as the menstruum, though occasionally, the lymph, which is itself a derivative from the chyle, is added, as in the case of the fatty tissue and the bones ; and that each preceding element or constituent of the body (धातु—शरीरारम्भक धातु) takes up the proper organic compounds from the food chyle to form the next element or tissue. Throughout also, the chemical changes are due to the metabolic heat which breaks up the compounds and recombines, but the operations and even the vehicles perhaps of this heat are different. For example, these heat-corpuscles in the biliary ducts produce the bile, but the bile-secretion is supposed to contain two distinct substances: (1) a digestive fluid in the duodenum (पित्ताशय) which acts on the chyme to produce the chyle (अन्नस्य पक्तृ पाचकाख्यं पित्तं); and (2) a colouring bile-substance in the liver which adds a red pigment to the chyle, and transforms it into blood (रञ्जकाख्यं पित्तं). Besides, there are three other biles, of which the aqueous humour in the eye is supposed to be one (आलोचक पित्तं), helping in the formation of visual images (रूपग्राहकं). This is the view of Dhanvantari and his school, but Âtreya holds there is no evidence that the bile really performs the first (digestive) function, for this can be accounted for by the animal heat arising from the working of the whole bodily machine.

There are three different hypotheses regarding the course of metabolism and the successive transformations of the chyle (क्षीरदधिन्याय --केदारीकुल्यान्याय—खलेकपोतन्यायेति त्रिधा धातुपोषणक्रमः— Chakrapâṇî, Bhânumati, Sutrasthâna, XIV, 10 ; also his commentary on Charaka, Sutrasthâna, XXVIII), but my account is based on the second hypothesis which has the preference of Chakrapâṇî (स्वरसः). It may be added as a curiosity that each element of the body (धातु) under the metabolic heat is supposed to give off a finer essence (सूक्ष्मभाग) which serves as the material of the next succeeding element, and a dross (मल) which forms some of the excreta in the body (including the nails, the hair &c.), besides retaining its own substance (the gross or main part) which is driven along by the Vâyus (biomotor or vital currents), or by the *srotas*, to its destination in the body.

Some idea of circulation appears to have been entertained, for the heart which receives, and then sends down, the chyle through the *Dhamanis* gets it back transformed into blood, and the *ojas* also proceeds from the heart and returns to it along with the chyle and the blood.

(Cf. Vâgbhata ताः हृत्स्थाः शिराः रसात्मकं ओजः अभिवहन्त्यः)। पञ्चभूतात्मके देहे आहारः पाञ्चभौतिकः। विपक्वः पञ्चधा सम्यग् गुणान् स्वानभिवर्द्धयेत् । Susruta, *Sutrasthâna*, Chap. 46, cf. also, वियत्पवनजाताभ्यां वृद्धिमाप्नोति मारुतः । आग्नेयमेव यद्द्रव्यं तेन पित्तमुदीर्यते । *Ibid*, Chap 41. भौमाप्याग्नेयवायव्याः पञ्चोष्माणः सनाभसाः । पञ्चाहारगुणान् स्वान् स्वान् पार्थिवादीन् पचन्त्यनु । यथास्वं ते च पुष्णन्ति पक्त्वा भूतगुणान् पृथक् । पार्थिवाः पार्थिवानेव शेषाः शेषांश्च देहगान्। अतिरिक्ता गुणा रक्ते वह्नेर्मांसे तु पार्थिवाः । मेदस्यपां भुवश्चास्थि पृथिव्यनिलतेजसां । Charaka quoted by Dalvana. आदौ षड्रससम्पन्नं मधुरीभूतमीरयेत्, फेणीभूतं कफं यातं विदाहादम्लतां गतः । वायुना समानाख्येन ग्रहणीमभिनीयते । षष्ठी पित्तधरा नाम या कला परिकीर्त्तिता । आमपक्वाशयान्तःस्था ग्रहणी साऽभिधीयते । अग्न्यधिष्ठानमन्नस्य ग्रहणाद् ग्रहणी मता । भुक्तमामाशये रुद्ध्वा सा विपाच्य नयत्यधः । बलवत्यबला त्वन्नमाममेव विमुञ्चति ।...अन्नस्य पक्तृ पित्तन्तु पाचकाख्यं पुरेरितम् । दोषधातुमलादीनामुष्मेत्यात्रेयशासनम् ।......तेजोरसानां सर्वेषामम्बुजानां यदुच्यते, पित्तोष्मणा सरागेण रसो रक्तत्व मृच्छति । वाय्वग्नितेजसा युक्तं रक्तं मांसत्व मृच्छति। श्लेष्माणं च समाश्रित्य मांसं वाय्वग्निसंयुतम्, स्थिरतां प्राप्य शौक्ल्यं च मेदो देहेऽभिजायते । पृथिव्यग्न्यनिलादीनां सङ्घातः श्लेष्मणावृतः, खरत्वं प्रकरोत्यस्य जायतेस्थि ततो नृणाम् । करोति तत्र सौषिर्यमस्थ्नां मध्ये समीरणः । मेदसा तानि पूर्यन्ते स्नेहो मज्जा ततः स्मृतः । तस्मान्मज्ज्ञश्च यः स्नेहः शुक्रं संजायते ततः । Charaka-Dridhavala Saṃhitâ quoted by Aruṇa in his commentary on Vâgbhata.

यथा केदारनिषक्तं कुल्याजलं प्रत्यासन्नां केदारीमाप्लावयति । तथा रस एव प्रथमं रक्तं प्लावयति । तत्र रक्तस्थान सम्बन्धात् रक्तसादृश्यं रक्तव्यपेदश्यंच अनुभवति । रक्तं च रक्तसमानेन स्तोकेनांशेन अस्रं पोषयति। ततो रक्त माप्लाव्य मांसमाप्लावयति, एवमुत्तरोत्तरधातून् रसएव प्लावयति । (Chakradatta Bhânumati). This passage shows that the 'venous blood' was conceived to be chyle-essence mixed with blood, and that the circulation of the chyle, so far as it was held to contribute its quota to the constituent elements and tissues of the body, was really supposed to be identical with the circulation of the blood (ततो रक्तमाप्लाव्य मांसमाप्लावयति). This will be abundantly clear from the following account of the course of the chyle and the blood :

ततः सारभूतस्याहाररसस्य द्वौ भागौ भवतः । स्थूलः सूक्ष्मश्च...ततः सूक्ष्मोभागः प्राणवायुनाप्रेरितो धमनीमार्गेण शरीरारम्भकस्य रक्तस्य स्थानं यकृत्-प्लीहरूपं गत्वा तेन सह मिलितोभवति । ततः प्राक्तन रक्तधातौ एव तिष्ठति ।...ततः सारभूतस्य आहाररसस्य द्वौ भागौ भवतः । स्थूलः सूक्ष्मश्च । स्थूलो भागो रञ्जकाख्येन पित्तेन रक्तीकृतः शरीरारम्भकं रक्तं पोषयन् व्यानवायुना प्रेरितोधमनीभिः सञ्चरन् सकलशरीरगतानि रुधिराणि पुष्णाति । ततः सूक्ष्मोभागः व्यानवायुनाप्रेरितो धमनीभिः शिराभिश्च शरीरारम्भकाणि मांसानि याति । *et seq.*

This finer essence of chyle which nourishes the flesh is also carried in the blood, on the irrigation channel hypothesis (केदारी-कुल्यान्याय).

SECTION 2.

THE CIRCULATORY SYSTEM.

The standing puzzle of Hindu anatomy and physiology is the classification of the *Siras*, *Dhamanis*, *Śrotas*, the channels, passages, and ducts in the body including the arteries, veins, nerves, lymphatic vessels, etc. The difficulty was felt by the ancient observers themselves. Some were of opinion that the *Dhamanis* and *Śrotas* are only modifications of the *Śiras*, and that the division is artificial. Susruta, however, contends that they are distinct, because they can be traced to different roots and have different functions ; they are apt to be confounded, only because they are minute, juxtaposed, and similar in function. (Susruta, *Śârîrasthâna*, Chapter IX). Charaka also accepts the established division, but points out that the numbers as estimated are conjectural (अनिर्द्देश्यमतः परं तर्क्यमेव *Śârîrasthâna*, Chapter VII).

The *Śiras*, *Dhamanis* and *Śrotas* form net-works (जालानि) of cords, fibres, passages, which in the fœtus take their rise from the umbilical cord, and proceed, upwards to the heart and head, downwards to the kidneys and rectum, and outwards to the trunk and limbs. These three classes comprise all the vehicles or conductors of the fluids, secretions and currents in the bodily system.

The *Śrotas* (*currents*). This is a peculiarity of Hindu physiology. The chyle, the blood, the Vâyu, the metabolic fluid (पित्त), the lymph, the fat, the marrow, in every part of the body, is supposed to be connected by means of subtle currents (*Śrotas*) with the same kind of fluid (or tissue) in every other part. Without supposing such special connections, many pathological phenomena cannot be explained.

The *Śiras* are divided into four groups : (1) the arteries for conducting the blood, (2) the lymphatics for conducting the lymph, (3) a class of bile ducts, and (4) a class of ducts for the *vâyus*, the currents which work the automatic and reflex machinery of the living organism. In each group, there are 10 trunk *Śiras*, which sub-divide into 175 cords, and further ramify minutely all over the body, even as a net-work of minute fibrils covers the leaf of a tree.

The functions of the different groups of *Śiras* are to conduct or transmit the (arterial) blood, the lymph, the bile, and the (vital) *vâyu* currents respectively to the different parts of the body. The *Śiras* are compared to the conduits of the flowing water in a pleasure-house (a garden), or the channels of irrigation that flood a field. The conduction (or transmission) of the fluids and currents is effected by an alternate dilation and contraction of the vessels, the systolic movement differing according to the nature of the fluid propelled :

(सप्त शिराशतानि भवन्ति याभिरिदं शरीरमाराम इव जलहारिणीभिः केदारइव च कुल्याभिरुपस्निह्यते अनुगृह्यते च आकुञ्चनप्रसारणादिभिर्विशेषैः। द्रुमपत्त्रसेवनीनामिव तासां प्रतानाः। तासां नाभिमूलं ततश्च प्रसरत्यूर्द्ध्वं अधस्तिर्य्यक् च। तासां मूलशिराश्चत्वारिंशत्। तासां वातवाहिन्यो दश पित्तवाहिन्यो दश कफवाहिन्यो दश दश रक्तवाहिन्यः *Susruta*, *Śârîrasthâna*, Chap. VII.)

The *Dhamanis* in the fœtus take their rise from the umbilical cord, thus bringing nourishment from the mother. They are divided into three groups: (*a*) ten trunks or cords going up to the heart, and thence to the head, (*b*) ten going down to the intestines, kidneys and rectum, and (*c*) four branching obliquely or sidewise, and ramifying over the whole body. In a general way, it may be stated that the *Dhamanis* comprise (1) the veins, (2) the nerves (including the sympathetic system), (3) the chyle-ducts (including the thoracic duct) as distinguished from the other lymphatics, which are classed as *Śiras*, (4) the ducts for urine, sweat, and other secretions, and (5) lastly, certain classes of bile-ducts and conductors of Vâyu currents, possibly those connected with the venous system and the chyle-ducts.

The first group of *Dhamanis* :—Special features :—Each of the ten ascending Dhamanîs, on reaching the heart, trifurcates, and proceeds to the head. Of these fibres, one pair is engaged in conducting each of the four sensory currents (those of sound, colour, taste and smell), *from the sense-organs, as Charaka and Susruta must have supposed, to the heart, which is for them the seat of consciousness* (हृदयं विशेषेण चेतनास्थानम्, Susruta, *Śarîrasthâna*, Chapter IV, हृदयं चेतनाधिष्ठानमेकम् Charaka, *Śarîrasthâna*, Chapter VIII). Other Dhamanîs, also in pairs, are engaged in conducting automatic (or voluntary) motor currents, (*e.g.*, the currents concerned in respiration, yawning, sleeping and waking), or the secretions of the lachrymal and mammary glands.

The second group of *Dhamanis* : - Special functions :

The descending *Dhamanîs* go down to the intestines, kidneys, bladder and rectum, and their special function is to convey, in pairs as before, urine and other secretions and excreta. They also convey the chyle from the small intestines to the ascending as well as the ramifying *Dhamanîs*. In addition, some of them convey sweat to the ramifying *Dhamanîs*.

The third group : Special functions. The remaining four *Dhamanis* ramify obliquely over the body into millions of fibres and fibrillæ, which terminate in the pores of the skin. From all parts of the periphery, they conduct the sensory currents of touch to the central organ of the heart (including the internal organic sensations). Being connected with the pores of the skin, they conduct sweat outwards, and the influences of baths, embrocations, and fomentations inwards.

Other *Dhamanis* serving as chyle-ducts and (venous) blood-vessels :—Besides the special functions performed by the three groups, there is one characteristic function common to certain classes of *Dhamanis* which are found in all the three groups—*viz.*, the conduction of chyle and (venous) blood, *i.e.*, of blood in the state of chyle, before it gets its red pigment from the liver. It may also be added that the three principal elements of the body, *Vâyu* (vital current), *Pitta* (bile, or rather the fluid animal heat which produces metabolism, पाक, and flows to all the parts of the body by means of connective passages), and *Kapha* (lymph), make use of the *Dhamanîs* as well as the *Śiras* and *Śrotas*, *i.e.*, of all manner of conductors in the organism (cf. Charaka, वातपित्त श्लेष्मणां पुनः सर्वशरीरचराणां सर्वाणि स्रोतांसि अयनभूतानि *Vimânasthana*, Chapter V).

The functions of the *Śiras* may, therefore, be stated as follows :—

(1) The conduction of blood from the liver and spleen, red blood (what may be called the arterial blood of this system of physiology) to the heart, head, trunk, limbs, etc.

(2) Common functions of all connective passages, *viz.*, the conduction of *Vâyu* (vital current), *Pitta* (metabolic fluid), and *Kapha* (lymph).

The different classes of *Dhamanis* with their functions are :—

(1) The nerves : (*a*) eight sensory (central) nerves for the four special senses other than touch, (*b*) twelve motor nerves partly for voluntary and partly for automatic movements, and (c) the nerves of touch and organic sensation, including the sympathetic nerves.

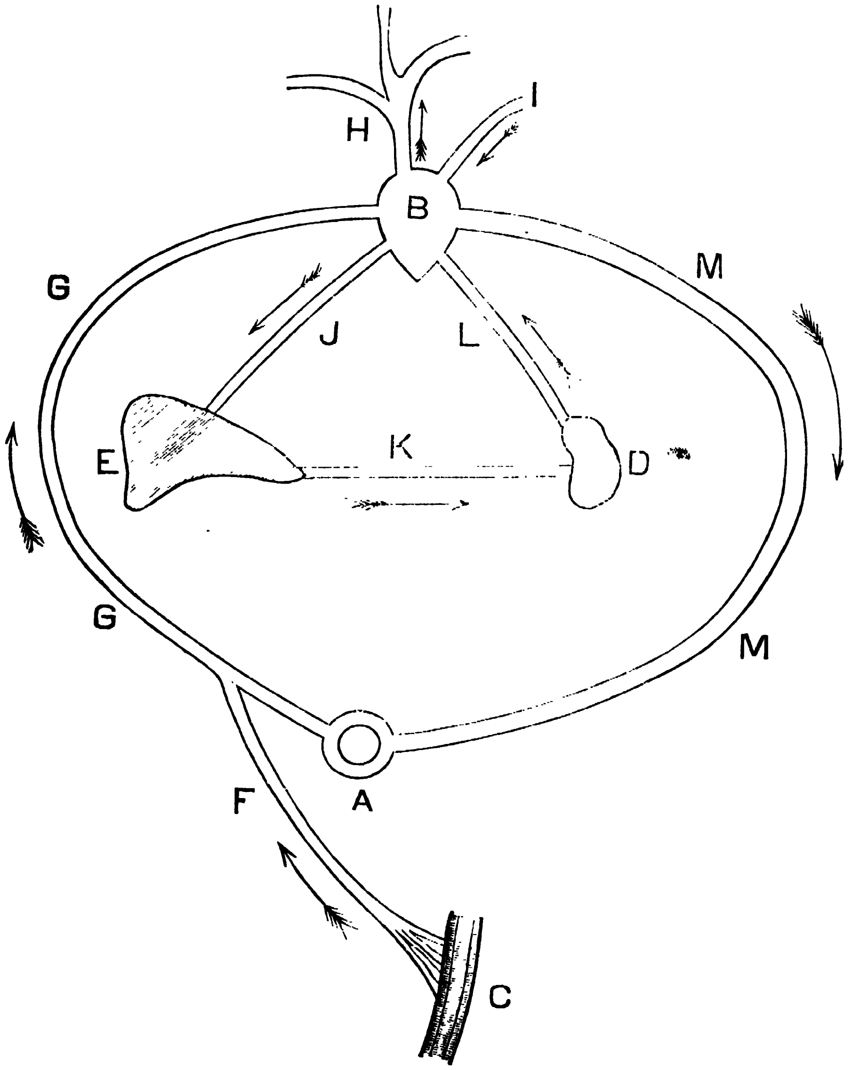
(2) The chyle-ducts, conductors of (venous) blood, - conveying the chyle before it is transformed into blood in the liver (and the spleen).

(3) The classes of *Dhamanîs*, which, in common with the *Śiras* and *Śrotas*, conduct *Vâyu*, *Pitta* and *Kapha*,—the prime movers of the organic life.

ŚIRAS AND DHAMANÎS AS BLOOD-VESSELS.

THE CIRCULATORY SYSTEM.

The anatomical arrangement of the *Śiras* and *Dhamanis* as conceived in this system of physiology is so fanciful and obscure (Charaka himself states that it is unascertainable and questionable) that it is with considerable diffidence that I attempt to reproduce in a chart the main features of the vascular and circulatory system. At the outset, I would premise that the mistake as to the relative position of the heart and the liver in man, which lasted till the middle of the sixteenth century in Europe and took a Vesalius to correct, was impossible to the Hindu anatomists, who habitually practised dissection on human corpses.



Conjectural Restoration of the Diagram of the central circulation of the Śiras and Dhamanîs after Charaka and Susruta. The obliquely branching Dhamanîs, and the ramifications of the Śiras are not shown.

(*a*) Navel,—the fœtal source of Siras and Dhamanîs,—may be taken as the starting point of the circulatory system.

(*b*) Heart (पुण्डरीकेण सदृशं हृदयं स्यादधोमुखम् । जाग्रतस्तद्विकसति स्वपतश्च निमीलति । Susruta, Sârira-sthâna IV),—the receptacle of the chyle poured into it by the ascending Dhamanîs;—source of the 'life currents' (प्राणवहानि स्रोतांसि), and seat of consciousness;—also supplies to the spleen and liver (venous) blood, or rather chyle mixed with blood, to be transformed into red (arterial) blood. The heart is also supplied by Śiras with true blood. Cf. प्रसन्नाभ्यां कफासृग्भ्यां हृदयं पंकजाकृति। शुषिरं स्यादधोवक्त्रं (संगीतरत्नाकर)

(c) Small intestine (पित्ताशय) which receives the chyme from the stomach (आमाशय), and, with the help of the bile brought from the liver, turns the chyme into chyle.

(d) Spleen, a minor source of blood (or blood vascular gland); on the left below the heart.

(तस्याधोवामतः प्लीहा—Susruta, Chapter IV).

(e) Liver, the major source of blood; the chyle gets a red pigment in the liver (and spleen) and is converted into true (arterial) blood. The liver is to the right.

(दक्षिणतो यकृत्—Susruta, Śârîrasthâna, Chapter IV).

(f) Dhamanî, conveying chyle from the small intestine to the great Dhamanî trunk (g) that ascends to the heart;—answers to the portal vein and thoracic duct (?)

(g) Dhamanî trunk, ascending from the navel to the heart; answers to the inferior Vena Cava.

(h) Dhamanî ascending from the heart to the head,—and trifurcating;—answers to the superior Vena Cava.

(i) Also, Dhamanî ascending from the heart, but brings back the (venous) blood to the heart (Pulm. Artery ?)

(j) Also, a Dhamanî, descending from the heart, and conveying the chyle and venous blood from the heart to the liver, where the blood takes a red pigment.

(k) Śira, connecting the liver with the spleen,—carrying the red blood from the liver to the spleen (Sp. vein).

(l) Śira, from the spleen to the heart, carrying the red blood to the heart.

(m) Śira, bringing red ("arterial") blood from the heart to the navel, the starting point, answering to the aorta.

N.B. The Śiras ramify from the liver and the spleen, and supply the trunk, head and limbs, with red (arterial) blood. Four Dhamanî trunks also, for the trunk and limbs, issue from the navel. They ramify into veins and capillary vessels (as also nerve fibres and fibrils) and carry chyle and (venous) blood over the entire system.

It is clear that Charaka and Susruta had no idea of the part played by the lungs in the purification of the blood. The liver converts the 'venous' blood in this system into true ('arterial') blood, and along with the spleen serves as a basis of discrimination between a Śira and a Dhamanî, thus illustrating Susruta's statement that the distinction between these two kinds of blood vessels must be accepted as real, inasmuch as they have different sources and different functions.

तासान्तु नाभिप्रभवानां धमनीनामूर्द्ध्वंगा दश दश चाधोगामिन्यश्चतस्रस्तिर्यंगाः ऊर्द्ध्वंगास्तु हृदयमभिप्रपन्ना त्रिधा जायन्ते। अधोगमास्तु पित्ताशयमभिप्रतिपन्नास्तत्रस्थमेवान्नपानरसं विपक्वं औष्ण्याद् विरेचयन्त्यः अभिवहन्त्यः शरीरं तर्पयन्ति चोर्द्ध्वंगतानां तिर्यग्गतानां रसस्थानमभिपूरयन्ति (Susruta, Śârîrasthâna, Chapter IX). तत्र पांचभौतिकस्य आहारस्य सम्यक् परिणतस्य यस्तेजोभूतः सारः परमसूक्ष्मः स रस इत्युच्यते। तस्य च हृदयं स्थानम्। स हृदयाच्चतुर्विंशतीः धमनीरनुप्रविश्य ऊर्द्ध्वंगा दश दश चाधोगामिन्यश्चतस्रस्तिर्यग्गाः कृत्स्नं शरीरं अहरहस्तर्पयन्त। तस्य शरीरमनुधावतोऽनुमानाद् गतिरुपलक्षयितव्या। स खल्वाप्योरसः यकृत्प्लीहानौ प्राप्य रागमुपैति। (*Ibid*, Chapter IV). रंजितास्तेजसास्त्वापः शरीरस्थेन देहिनां रक्तमित्यभिधीयते। (*Ibid*, Sutrasthâna, Chapter XIV).

सप्तशिराशतानि भवन्ति। याभिरिदं शरीरम् आराम इव जलहारिणीभिः केदार इव कुल्याभिरुपस्निह्यते आकुञ्चनप्रसारणादिभिर्विशेषैः। नाभ्यां सर्व्वा निवद्धास्ताः प्रतन्वन्ति समन्ततः। तासां मूलशिराः चत्वारिंशत्तासां वातवाहिन्यो दश पित्तवाहिन्यो दश कफवाहिन्यो दश दश च रक्तवाहिन्यः। तासान्तु वातबाहिनीनां वातस्थानगतानां पञ्चसप्ततिशतं भवति। रक्तवाहिन्यश्च यकृत्प्लीह्नोरेव। तत्र वातवाहिन्यः शिराः एकस्मिन् सक्थ्नि पञ्चविंशतिः। एतेन इतरसक्थिबाहू च व्याख्यातौ। विशेषतस्तु कोष्ठे पृष्ठे चोदरे वक्षसि जत्रुणः ऊर्द्ध्वं एवं रक्तवहाः कफवहाश्च धातूनां पूरणं वर्णं स्पर्शज्ञानमसंशयम्। स्वाः शिराः सञ्चरद्रक्तं कुर्य्याच्चान्यान् गुणानपि (Śârîrasthâna, Chapter VIII). द्वितीया (कला) रक्तधरा नाम। तस्यां शोणितं विशेषतस्तु शिरासु यकृत् प्लीह्नोश्च भवति (*Ibid*, Chapter IV). षष्ठी (कला) पित्तधरानाम। चतुर्विधमन्नपानमुपयुक्तमामाशयात् प्रच्युतं पक्वाशयोपस्थितं धारयति। स्रोतस्तद् विज्ञेयं शिराधमनीवर्ज्जितं।...तानि (स्रोतांसि) प्राणान्नोदकरसरक्तमांसमेदोमूत्रपुरीषशुक्रार्त्तववहानि। तत्र प्राणवहे द्वे। तयोर्मूलं हृदयं रसवाहिन्यश्च धमन्यः। उदकवहे द्वे। तयोर्मूलं तालुक्लोम (*Kloma*, gall-bladder) च। तत्र विद्धस्य पिपासा। अन्नवहे द्वे। तयोर्मूलं आमाशयः अन्नवाहिन्यश्चधमन्यः। रसवहे द्वे। तयोर्मूलं हृदयं रसवाहिन्यश्च धमन्यः। रक्तवहे द्वे। तयोर्मूलं यकृत् प्लीहानौ रक्तवाहिन्यश्च धमन्यः। मांसवहे द्वे। तयोर्मूलं स्नायुस्त्वचं रक्तवाहिन्यश्च धमन्यः।

SECTION 3.

THE NERVOUS SYSTEM IN CHARAKA.

*The Nerves. Dhamanîs as nerves :—The anatomy of the nervous system in Charaka and Susruta, can be more clearly and confidently restored. The Dhamanîs that ascend from the heart divide into 30 cords, of which 20, *i.e.*, 10 pairs, are cranial nerves, and the other 10, or 5 pairs, are engaged in conveying vital currents, metabolic fluid, lymph, blood and chyle.

The cranial nerves are : (1) four pairs of sensory nerves carrying sensory impulses from the sense-organs to the heart, *viz.*, the optic, auditory, olfactory, and gustatory nerves and (2) six pairs of motor (or mixed nerves), *e.g.*, three pairs of motor nerves for the eye (Motores oculorum, Pathetic and Abducentes) working the Levator Palpebræ and other muscles of the orbit; one pair of motor nerves for articulation, the hypoglossal; one pair of motor nerves for the larynx, (the Pneumo-gastric), and another pair connected with mammæ and (in the case of the male) the seminal duct. It is further stated that other motor or sensori-motor impulses are carried by some of these cranial nerves, *viz.*, those which produce sighs and sobs, yawning, laughter and hunger. Evidently some of the functions of the pneumogastric and the spinal accessory nerves are intended, as also of the phrenic and other nerves of the cervical plexus.

Of the 30 descending Dhamanîs, 10 (or 5 pairs) are conductors of blood, chyle, vital current, metabolic fluid and lymph, and the remaining 20 are spinal nerves (specially the nerves of the sacro-coccygeal and sacral plexuses, if not also of the lumbar plexus). The obliquely branching Dhamanîs, so far as they are nerves, comprise the brachial and the lumbar plexus, and divide and sub-divide hundred-fold, thousand-fold, till they ramify into fibrillæ round the pores of the skin. They carry to the heart cutaneous sensations, external as well as internal. A fibril (सूक्ष्मनाड़ी) is said to be as minute as the thousandth part of a hair (लोम्नः सहस्रभागेन तुल्यासु प्रचरत्यणुः – *Panchadasi*).

ऊर्द्ध्वगाः शब्दरूपरसगन्धप्रश्वासोच्छ्वासविजृम्भितक्षुद्धसितकथितरुदितादीन् विशेषान् अभिवहन्त्यः शरीरं धारयन्ति। तास्तु हृदयमभिप्रतिपन्नास्त्रिधा जायन्ते तास्त्रिंशत्। तासान्तु वातपित्तकफशोणितरसान्। द्वे द्वे वहतस्ता दश। शब्दरूपरसगन्धान् अष्टाभिर्गृह्णीते। द्वाभ्यां भाषते। द्वाभ्यां घोषं करोति। द्वाभ्यां

स्वपिति । द्वाभ्यां प्रतिबुध्यते । द्वे च अश्रुवाहिन्यौ । द्वे स्तनसंश्रिते । ते एव शुक्रं नरस्य स्तनाभ्यां अभिवहतः ।

तिर्य्यग्गानान्तु चतसृणां धमनीनां एकैका शतधा सहस्रधा चोत्तरोत्तरं विभज्यन्ते तास्त्वसंख्येयाः ।

ताभिरिदं शरीरं गवाक्षितं तासां मुखानि रोमकूप प्रतिबद्धानि । यैः स्वेदमभिवहन्ति रसञ्चापि सन्तर्पयन्ति अन्तर्बहिश्च । तैरेव चाभ्यङ्गपरिषेकावगाहालेपनवीर्य्याणि अन्तःशरीरमभिप्रतिपद्यन्ते । त्वचि विपक्वानि तैरेव स्पर्शसुखमसुखं वा गृह्णाति । तास्तु एताश्चतस्रोध मन्यः सर्वाङ्गगताः सविभागा व्याख्याताः । (Susruta Sârîrasthâna, Chapter IX.)

SECTION 4.

THE NERVOUS SYSTEM AFTER THE TANTRAS—PSYCHOPHYSIOLOGY.

In Charaka and Susruta (as in Aristotle) the heart is the central organ and seat of consciousness. But in the Tantric writings (as in Galen), the seat of consciousness is transferred to the brain or rather the cerebro-spinal system. The Soul (the Jiva) has its special seat within the *Brahmarandhra* above the foramen of Monro and the middle commissure, but traverses the whole cerebro-spinal axis, up and down, along the *Sushumna* (the central canal of the spinal cord). The *Brahmadanda* (vertebral column) contains the *Brahma-Nâdi*, the *Sushumna* and the *Manovahâ Nâdi*. The cerebro-spinal axis with the connected sympathetic system contains a number of ganglionic centres and plexuses, (*Chakras, Padmas*) from which nerves (*Nâdis, Śirâs* and *Dhamanis*)* radiate over the head, trunk and limbs.

SECTION 5.

GANGLIONIC CENTRES AND PLEXUSES (SYMPATHETIC-SPINAL SYSTEM).

Beginning with the lower extremity, the centres and plexuses of the connected spinal and sympathetic systems may be described as follows :—

(1) The *Adhâra Chakra*, the sacro-coccygeal plexus, with four branches, nine *Angulis* (about six inches and a half) below the solar plexus (*Kanda, Brahmagranthi*); the source of a massive pleasurable æsthesia, voluminous organic sensations of repose. An inch and a half above it, and the same distance below the membrum virile (*Mehana*) is a minor centre called the *Agni-sikhâ*.

(2) The *Svâdhisthâna Chakra*, the sacral plexus with six branches (पत्राणि, दलानि leaves), concerned in the excitation of sexual feelings with the accompaniments of lassitude, stupor, cruelty, suspicion, contempt.

(3) The *Nâvi kanda* (corresponding to the solar plexus, *Bhânubhavanam*)—which forms the great junction of the right and left sympathetic chains (*Pingalâ* and *Idâ*) with the cerebro-spinal axis.

Connected with this is the *Manipuraka*, the lumbar plexus with connected sympathetic nerves, the ten branches of which are concerned in the production of sleep and thirst, and the expressions of passions like jealousy, shame, fear, stupefaction.

(4) The *Anâhata Chakra*, possibly the cardiac plexus of the sympathetic chain, with twelve branches, connected with the heart, the seat of the egoistic sentiments, hope, anxiety, doubt, remorse, conceit, egoism, etc.

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* The writers of the Yoga and Tantra schools use the term *Nâdi*, by preference, for Nerves. They also mean Cranial nerves when they speak of *Sirâs*, never using the latter term for Arteries, as in the older medical literature.

(5) The *Bhâratisthâna*, the junction of the spinal cord with the medulla oblongata, which, by means of nerves like the pneumo-gastric, etc., regulate the larynx and other organs of articulation.

(6) The *Lalanâ Chakra* opposite the uvula, which has twelve leaves (or lobes), supposed to be the tract affected in the production of ego-altruistic sentiments and affections like self-regard, pride, affection, grief, regret, respect, reverence, contentment, etc.

(7) The sensori-motor tract, comprising two Chakras, (*a*) the *Âjnâ Chakra*, lit. the circle of command (over movements), with its two lobes (the cerebellum), and (*b*) the *Manaschakra*, the sensorium, with its six lobes (five special sensory for peripherally initiated sensations, and one common sensory for centrally initiated sensations, as in dreams and hallucinations).

The *Âjna-vaha Nâdis*, efferent or motor nerves, communicate motor impulses to the periphery from this *Âjnâ Chakra*, this centre of command over movements; and the afferent or sensory nerves of the special senses, in pairs, the *Gandhavahâ Nâdi* (olfactory sensory), the *Rupavahâ Nâdi* (optic), the *Savdavaha Nâdi* (*auditory*), the *Rasavahâ Nâdi* (gustatory), and the *Sparaśavaha Nâdi* (tactile), come from the periphery (the peripheral organs of the special senses) to this *Manaschakra*, the sensory tract at the base of the brain. The *Manaschakra* also receives the *Manovahâ Nâdi*, a generic name for the channels along which centrally initiated presentations (as in dreaming or hallucination) come to the sixth lobe of the *Manaschakra*.

(8) The *Somachakra*, a sixteen-lobed ganglion, comprising the centres in the middle of the cerebrum, above the sensorium; –the seat of the altruistic sentiments and volitional control, *e.g.*, compassion, gentleness, patience, renunciation, meditativeness, gravity, earnestness, resolution, determination, magnanimity, etc.; and lastly

(9) The *Sahasrâra Chakra*, thousand-lobed, the upper cerebrum with its lobes and convolutions, the special and highest seat of the *Jiva*, the soul.

गुह्यलिङ्गान्तरे चक्रमाधाराख्यं चतुर्दलम् । परमः सहजः...आनन्दः...स्यादैशानादिदले फलं । स्वाधिष्ठानं लिङ्गमूले षट्पत्रं चक्रमस्यच । पूर्व्वादिषु दलेषु फलानि एतानि प्रश्रयः क्रूरता...मूर्च्छा...अवज्ञा स्यादविश्वासः कामशक्ते रिदं गृहम् । नाभौ दशदलं चक्रं मणिपूरसंज्ञं । सुषुप्तिरत्र तृष्णा स्यादीर्षा...लज्जा भयं घृणा मोहः......क्रमात् पूर्व्वादि दलेषु स्यात् भानुभवनञ्च तत् ।

हृदये अनाहतं चक्रं । दलैर्द्वादशभिर्युतं । लौल्यं कापट्यं वितर्कोऽप्यनुतापिता, आशा...चिन्ता...दम्भोवैकल्ल्यं विवेकोऽहंकृतिस्तथा फलान्येतानि । कण्ठेऽस्ति भारतीस्थानं षोडशच्छदं तत्र प्रणव उद्दीप्तः सप्त स्वरा षड्जादयः । ललनाख्यं घण्टिकायां चक्रं द्वादशपत्रकं । दमोमानस्ततः स्नेहः शोकः खेदश्च सम्भ्रम श्चोर्म्मिः श्रद्धा तोषोऽपराधिता । फलानि ललनाचक्रे भ्रूमध्ये द्विदलं चक्रं आज्ञासंज्ञं फलानि च आविर्भावाः सत्त्वरजस्तमसां । तत्र चास्ति मनश्चक्रं षड्दलं तत्फलानि तु । स्वप्नो रसोपयोगश्च घ्राणं रूपोपलम्भनं

स्पर्शनं शब्दबोधश्च पूर्व्वादिषु दलेषु । ततोऽपि षोड़शदलं सामचक्रं । दलेषु षोडश तस्य कलाः षोडश संस्थिताः । कृपाथ मार्द्दवं धैर्य्यं वैराग्यं धृतिसम्पदौ हास्यं रोमाञ्चं विनयो ध्यानं सुस्थिरता ततः: गाम्भीर्य्यमुद्यमोऽक्षोभ मौदार्य्यैकाग्रहे क्रमात् । फलान्युद्यन्ति जीवस्य पूर्व्वादिदलगामिनः । चक्रं सहस्रपत्रन्तु ब्रह्मरन्ध्रे । सुषुम्नया ब्रह्मरन्ध्रमारोहत्यवरोहति । जीवः प्राणसमारूढो रज्ज्वा कोलाटिको यथा । ब्रह्मरन्ध्रे स्थितो जीवः सुधया संप्लुतः । आधाराद्द्व्यङ्गुलादूर्ध्वं मेहनाद्द्व्यङ्गुलादधः अग्निशिखा (चक्रं) चक्रात् तस्मात् (आधारचक्रात्) नवाङ्गुलः देहस्य कन्दोऽस्ति । उत्सेधायामाभ्यां

चतुरङ्गुलः ब्रह्मग्रन्थिरितिप्रोक्तः । (संगीतरत्नाकर as summarised in Dâmodara's Sangita-darpana. *Vide* Sangîta-ratnâkara, पिण्डोत्पत्तिप्रकरणं verses 116-144) दीर्घास्थिमूर्द्धपर्यन्तं ब्रह्मदन्तेति कथ्यते तस्यान्ते सुषिरं सूक्ष्मं ब्रह्मनाडीति सूरिभिः (उत्तरगीता)—तत् कार्णकायां विश्वग्व्यापिशाखासहस्रवत्या मनोवहनाड्य मूलं तिष्ठति । तस्या अलाबुल तकायाइव ऊर्द्ध्वमुखे । एकाशाखा सुषुम्ना इति गीयते । स वौमनोवहा नाड़ी चित्तस्थानं भवति (विज्ञानभिक्षुयोगवार्त्तिक) सुषुम्ना चोर्द्ध्वगामिनी ज्ञाननाड़ी भवेत् (*Jnâna Sankalinî Tantra.*) For functions of *Âjnâvahâ Nâdî* and *Manovahâ Nâdi*, also see Sankara Misra's *Upaskâra.*

The cerebro-spinal axis and the heart :—their respective relations to the conscious life :—Vijnânabhikshu, in the passage just quoted, identifies the *Manovahâ Nâdi* (vehicle of consciousness, चित्तस्थानं) with the cerebro-spinal axis and its ramifications, and compares the figure to a inverted gourd with a thousand-branched stem hanging down. The *Sushumna*, the central passage of the spinal cord, is the stem of this gourd (or a single branch). The writers on the Yoga (including the authors of the various Tantric systems) use the term somewhat differently. On this view, the *Manovahâ Nâdi* is the channel of the communication of the *Jiva* (soul) with the *Manaschakra* (sensorium) at the base of the brain. The sensory currents are brought to the sensory ganglia along afferent nerves of the special senses. But this is not sufficient for them to rise to the level of discriminative consciousness (सविकल्पकज्ञानम्) A communication must now be established between the *Jiva* (in the *Sahasrâra Chakra*, upper cerebrum) and the sensory currents received at the sensorium, and this is done by means of the *Manovâha Nadi.* When sensations are centrally initiated, as in dreams and hallucinations, a special *Nâdi* (*Svapnavahâ Nadi*), which appears to be only a branch of the *Manovahâ Nâdi*, serves as the channel of communication from the *Jiva* (soul) to the sensorium. In the same way, the *Ajnâvahâ Nâdi* brings down the messages of the Soul from the *Sahasrâra* (upper cerebrum) to the *Ajna Chakra* (motor tract at the base of the brain), messages which are thence carried further down, along efferent nerves, to various parts of the pheriphery. I may add that the special sensory nerves together with the *Manovahâ Nadi* are sometimes generally termed *Jnânavahâ Nadî*, lit., channel of presentative knowledge. There is no difficulty so far. The *Manovahâ Nâdî* and the *Ajnâvahâ Nâdî* connect the sensori-motor tract at the base of the brain (*Mânaschakra* and *Ajnâchakra*) with the highest (and special) seat of the soul (Jiva) in the upper cerebrum (Sahasrâra), the one being the channel for carrying up the sensory, and the other for bringing down the motor messages. But efforts of the will (*Ajnâ, Prayatna*) are conscious presentations, and the *Manovahâ Nadi* must therefore co-operate with the *Ajnâvahâ* in producing the consciousness of effort. Indeed, attention, the characteristic function of *Manas*, by which it raises sense-presentations to the level of discriminative consciousness, implies effort (*Prayatna*) on the part of the soul (*Âtman, Jiva*), an effort of which we are conscious through the channel of the *Manovahâ Nâdi.* But how to explain the presentation of effort in the motor-nerves ? Sankara Misra, the author of the *Upaskâra* on *Kanâda's Sûtras*, argues that the *Nâdis* (even the volitional or motor nerves) are themselves sensitive, and their affections are conveyed to the sensorium by means of the nerves of the (inner) sense of touch (which are interspersed in minute fibrillæ among them). The consciousness of effort, then, in any motor nerve, whether *Ajnâvahâ* (volitional-motor), or *Prânavahâ* (automatic-motor), depends on the tactile nerves (or nerves of organic sensation) mixed up with it. Thus the assimilation of food and drink by the automatic activity of the *Prânas* implies an (automatic) effort (जीवनयोनिप्रयत्न) accompanied by a vague organic consciousness, which is due to the fact that minute fibres of the inner touch-sense are interspersed with the machinery of the automatic nerves (the *Prânavahâ Nâdis*).

यद्यपीन्द्रियं मनोन साक्षात् प्रयत्नविषयः तथापि मनोवहनाडीगोचरेण प्रयत्नेन मनसि कर्म्म द्रष्टव्यं । नाड्यास्तु त्वगिन्द्रियग्राह्यत्वमङ्गीकर्त्तव्यं । अन्यथा प्राणवहनाडीगोचरेण प्रयत्नेन अशित-पीताद्यभ्यवहरणमपि न सम्भवेत् । तत्तदिन्द्रियप्रदेशेन मनःसंयोगमन्तरेण सुखदुःखे न स्यातामेव । यदि मनसि कर्म्म न भवेत् न भवेच्च पादे मे सुखं शिरसि मे वेदना इत्याद्याकारोऽनुभवः ।

(Sankara Misra's *Upaskâra*, on Sûtras 14, 15, *Ahnika* 2, Chap. V.)

The Heart. The heart in the older schools is considered to be the seat of waking consciousness. For the heart expands during waking life and contracts during sleep.

Sleep (स्वाप) again is of two kinds (1) dreaming sleep (*swapna, supti*) when the external senses are withdrawn into the heart, but the representative-presentative faculty (मनः, चित्तं) wakes, and (2) dreamless sleep (*suṣupti*) when this last faculty is likewise merged in the mere automatic activity of life.

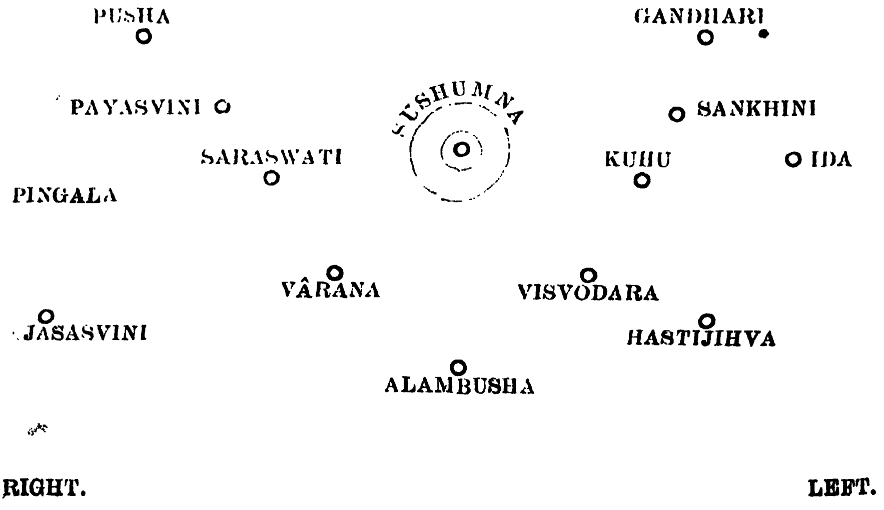
हृदयं पंकजाकृति । सुषिरं स्यादधोवक्त्रं एतच्च चेतनास्थानं । निमीलति स्वपित्यात्मा जागर्त्ति विकशत्यपि । द्वेधा स्वप्नसुषुप्तिभ्यां स्वापः । बाह्येन्द्रियाणि चेत् लीयन्ते हृदि जागर्त्ति चित्तं सुप्तिस्तदोच्यते । मनश्चेत् लीयते प्राणे सुषुप्तिः स्यात्तदात्मनः— (*Sangîta-ratnâkara*).

SECTION 6.

NERVE CORDS AND FIBRES (SYMPATHETIC-SPINAL SYSTEM).

Nerve-cords and Fibres - Cranial and spinal nerves, and the connected sympathetic nerves:—With the writers on the Yoga, all the *Siras*, and such of the *Dhamanis* as are not vehicles of vital current, metabolic fluid, lymph, chyle or blood, are cranial nerves, and proceed from the heart through the spinal cord to the cranium. These cranial nerves include pairs for the larynx and the tongue, for the understanding and use of speech, for the raising and lowering of the eyelids, for weeping, for the sensations of the special senses, etc.—a confused and unintelligent reproduction of Susruta's classification. But the enumeration of the spinal nerves with the connected sympathetic chain and ganglia, is a distinct improvement on the old anatomists. The following plan attempts to give a rough idea of the relative position of the principal nerves of the sympathetic-spinal system.

TRANSVERSE SECTION.



The *Susumnâ* is the central cord in the vertebral column (ब्रह्मदण्ड, मेरु). The two chains of sympathetic-ganglia on the left and the right are named *Idâ* and *Pingalâ* respectively. The sympathetic nerves have their main connection with *Susumnâ* at the solar plexus (भानुभवन, नाभिचक्र in the कन्द, नाभिकन्द or ब्रह्मग्रन्थि). Of the seven hundred nerve-cords of the sympathetic-spinal system (भूरिसिरा : Sangîta-ratnâkara), the fourteen most important are :—

(1) *Susumnâ*, in the central channel of the spinal cord.

(2) *Idâ*, the left sympathetic chain stretching from under the left nostril to below the left kidney,—in the form of a bent bow.

(3) *Pingalâ*, the corresponding chain on the right.

(4) *Kuhu*, the pudic nerve of the sacral plexus, to the left of the spinal cord.

(5) *Gandhârî*, to the back of the left sympathetic chain,—supposed to stretch from below the corner of the left eye to the left leg. It was evidently supposed that some nerves of the cervical plexus came down through the spinal cord and joined on to the great sciatic nerve of the sacral plexus.

(6) *Hastijihvâ*, to the front of the left sympathetic chain stretching from below the corner of the left eye to the great toe of the left foot, on the same supposition as before. Pathological facts were believed to point to a special nerve connection between the eyes and the toes.

(7) *Sarasvatî*, to the right of *Susumnâ*, stretching up to the tongue (the hypo-glossal nerves of the cervical plexus).

(8) *Pusâ*, to the back of the right sympathetic chain, stretching from below the corner of the right eye to the abdomen (a connected chain of cervical and lumbar nerves).

(9) *Payasvinî*, between Pusâ and Sarasvatî, auricular branch of the cervical plexus on the right.

(10) *Sankhinî*, between Gandhârî and Sarasvatî, auricular branch of the cervical plexus on the left.

(11) *Yaśasvinî*, to the front of the right sympathetic chain, stretching from the right thumb to the right leg (the radial nerve of the brachial plexus continued on to certain branches of the great sciatic).

(12) *Vâranâ*, the nerves of the sacral plexus, between Kuhu and Jasasvinî, ramifying over the lower trunk and limbs.

(13) *Visvodara*, the nerves of the lumbar plexus, between Kuhu and Hastijihva, ramifying over the lower trunk and limbs.

(14) *Alambusa*, the coccygeal nerves, proceeding from the sacral vertebræ to the urino-genitary organs.

(*Vide* Sangîta-ratnâkara, स्वराध्याय, पिण्डोत्पत्तिप्रकरणम् slokas 144-156. Also, the Yogârnava.)

SECTION 7.

AUTOMATIC AND REFLEX ACTIVITY OF THE ORGANISM —*THE FORTY-NINE VAYUS.*

Charaka describes *Vâyu* as that which keeps the machine of the body at work, the prime-mover, the impelling force which sets in motion the organs (including the senses and the mind), which arranges the cells and tissues, and which unfolds or develops the fœtal structure out of the fertilised ovum. Charaka and Susruta notice the five chief *Vâyus* with their functions in the maintenance of the animal life. Susruta mentions

Prâṇa as having its course in the mouth, and concerned in deglutition, hiccough, respiration, etc., *Udâna* as concerned in articulation and singing, *Samâna* as digesting the food in the stomach in conjunction with the animal heat, *Vyâna* as coursing all over the body, driving the chyle and causing the flow of blood and sweat, and *Apâna* as having its seat in the intestinal region, and sending down the uro-genital secretions. (Susruta-*Nidânasthâna*, Chapter I.)

In the mediaeval physiology the number of *Vâyus* is given as 49. As in Charaka and Susruta, the *Vâyus* are regarded as the moving or impelling forces that work the organism and all its automatic and reflex machinery. The *Ajnâ-vahâ Nâḍis* (efferent nerves) are only channels for the conduction of commands of the self or the will (आत्मप्रयत्न); the *Vâyus*, on the other hand, are forces (or currents) that maintain the automatic, reflex or instinctive activities of the organism. The ten chief *Vâyus* with their functions are enumerated thus :—

(1) *Prâṇa*, which works the ideo-motor verbal mechanism and vocal apparatus, the respiratory system, the muscles engaged in coughing, sighing, etc.

(2) *Apâna*, which ejects the excretions and wastes, the urine, the faeces, the sperm and germ-cells, etc.

(3) *Vyâna*, whose work is extension, contraction and flexion of the muscles, tendons and ligaments ; the stored-up energy of the muscles.

(4) *Samâna*, the force, which, in conjunction with animal heat, works the machinery of metabolism, in the maintenance of the organic life. It drives or propels the chyle, blood, and every other current (*Srota*) or circulating fluid in the body.

(5) *Udâna*, concerned in maintaining the erect posture of the body.
(6) *Nâga*, which is concerned in involuntary retching, vomiting.
(7) *Kurma*, which works the automatic movement of the eyelids, winking, etc.
(8) *Krikara*, concerned with the appetites of hunger and thirst.
(9) *Devadatta*, which brings about yawning, dozing, etc.
(10) *Dhanajaya*, which is concerned with coma, swooning, trance.

वायुः तन्त्रयन्त्रधरः प्रवर्तकः चेष्टानां, प्रणेता मनसः, सर्व्वेन्द्रियाणां उद्योतकः, सर्वशरीरधातुव्यूहकरः, सन्धानकरः शरीरस्य, प्रवर्त्तको वाचः, हर्षोत्साहयोर्योनिः, क्षेप्ता वहिर्मलानां, कर्त्ता गर्भाकृतीनां। प्राणापानोदानसमानव्यानात्मा (चरक सूत्रस्थान Chapter XII) तेषां मुख्यतमः प्राणः शब्दोच्चारणनिःश्वासोच्छ्वासकाशादिकारणं, अपानः...अस्य मूत्रपुरीषादिविसर्गः कर्म्म कीर्त्तितं। व्यानः... प्राणापानधृतित्यागग्रहणाद्यस्य कर्म्म च। समानोऽपि अखिलं व्याप्य शरीरं वह्निना सह। द्विसप्तति सहस्रेषु नाडीरंध्रेषु संचरन् भुक्तपीतरसान् सम्यगानयन् देहपुष्टिकृत्। उदानः कर्म्मास्य देहोन्नयनोत्क्रमणादि प्रकीर्त्तितं। त्वगादिधातूनाश्रित्य पंचनागादयःस्थिताः उद्गारादि निमेषादि क्षुत्पिपासादिकं क्रमात्। तन्द्राप्रभृति मोहादि तेषां कर्म्म प्रकीर्त्तितं। (संगीतरत्नाकर)

Cf. the Summary in Raja Sourindra Mohan Tagore's edition of the Sangîta Darpaṇa.

शब्दोच्चारणं (वाङ्निष्पत्तिकरणं) निश्वासः उच्छ्वासः (अन्तर्मुखश्वासः) तदादीनां कारणं (साधनं) प्राणवायुः। विण्मूत्रशुक्रादिवहत्वमपानस्य कर्म्म। आकुञ्चनप्रसारणादि व्यानस्य कर्म्म ज्ञेयं। अशितपीतादिनां समतानयनद्वारा शरीरस्य पोषणं समानस्य कर्म्म। उदानवायुः ऊर्द्ध्वनयनमेव अस्य कर्म्म नागादयः नागकूर्मकृकरदेवदत्तधनञ्जयरूपाः पञ्च वायवः। एतेषां कर्म्माणि च यथाक्रमं उद्गारोन्मीलनक्षुधाजननविजृम्भनमोहरूपाणि। (*Sangîtadarpaṇa*, Chap. I, Slokas 43-48). Cf. the extract in Sankara.

प्राणः प्राग्वृत्तिरुच्छ्वासादिकर्म्मा । अपानः अवाग्वृत्तिरुत्सर्गादिकर्म्मा व्यानः तयोः सन्धौ वर्तमानः वीर्यवत्कर्म्महेतुः। उदानः ऊर्द्ध्ववृत्तिः उत्क्रान्त्यादि हेतुः । समानः समं सर्व्वेषु अङ्गेषु यः अन्नरसान् नयति । इति । (*Sârîraka Bhâṣya*, Chap. II, Pada 4, Sutra 2.)

SECTION 8.

FŒTAL DEVELOPMENT (AFTER SUSRUTA). *

The ovum fertilised by the sperm-cell and developing under the influence of animal-heat forms successive layers and tissues, even as layers of cells and fibres are formed in wood. First are formed seven layers, epithelial and dermal (*Saptatwacha*), then follow the several tissues (*Kalâh*), the flesh, the vascular tissue, the fat and marrow, the lymphatic and (glandular) tissue, the intestinal tissues, the biliary and the seminal vessels. These tissues are regarded by some as modifications of the original dermal layers of the ovum (cf. the layers of the blasto-derm and their relation to the tissues in Embryology). The tissues are supposed to be developed successively, one out of another, by chemical action or metabolism (*pâka*), *e.g.*, chyle is transformed into blood, blood into flesh, flesh into fat, fat into bone, bone (in reality, fat in the bones) into marrow, marrow into sperm-cell. The organs are next formed out of the tissues. The liver, gall-bladder (*kloma*), spleen and lungs are referred to the blood; the intestines to the blood, lymph and bile; the kidneys to the blood and fat; the testicles to the blood, lymph and fat; the heart to the blood and lymph; and the tongue to the lymph, blood and flesh. *Vâyu*, with the accompaniment of animal heat, impels the 'currents' (*srotâmsi*) in the system; *Vâyu* acting on the flesh gives rise to the muscles; and it is *Vâyu*, again, which, with the essence of fat (or marrow), produces the nerves, arteries and tendons (Susruta, *Sarîrasthâna*, Chapter IV, and *Sutrasthâna*, Chapter XIV).

The following parts (tissues and organs) in the fœtus are in a special sense modifications of the four organic substances (compounds) contributed by the sperm-cell of the male-parent, hair, nails, teeth, bones, nerves, veins, and arteries, tendons and ligaments, and the sperm-cell; the following of the four organic substances are derived from the mother: skin, blood, flesh, fat, the heart, liver and spleen, kidneys, stomach, intestines, &c. (Charaka, *Sarîrasthâna*, Chapter III).

The rudiments of the head and the limbs begin to appear in the third month, and are developed in the fourth; the bones, ligaments, nails, hair, &c. become distinct in the sixth. In the second month the sexual character is indicated by the shape of the fœtus, the shape of a round joint (?) indicating the male sex, and an elongated shape as of a muscle (?) the female sex [cf. Charaka, *Sârîrasthâna*, Chapter IV,—द्वितीयेमासि घनः सम्पद्यते पिण्डः पेश्यर्ब्बुदं वा । तत्र घनः पिण्डः पुरुषः स्त्री पेशी अर्ब्बुदं नपुंसकः Chakrapâni notes घनः कठिनः । पिण्डो ग्रन्थ्याकारः । पेशी दीर्घमांसपेश्याकारा । अर्बुदं वर्त्तुलोन्नत loc cit.

SECTION 9.

HEREDITY.

Transmission of specific characters—what parental characters are transmitted to offspring. The question is raised in Charaka (and earlier still, in the *Brâhmanas*) how specific characters are transmitted,—why the offspring is of the same species as the parental organism, say, the human or bovine species, the equine species (Charaka), or the Asvattha species, Ficus religiosa, (Sankara Brihadâranyaka-bhâṣya). Species (योनयः) may be compared to so many moulds as it were, into which the ovum is cast, even as molten metals are cast in moulds. This is of course only an illustrative analogy; the cause has to be investigated.

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* Reproduced from my monograph in Dr. Ray's *Hindu Chemistry*, Vol. II.

Now Charaka and Susruta, following Dhanvantari, hold that the fœtus, or rather the fertilised ovum, develops by palingenesis (instead of epigenesis); in other words, all the organs are potentially present therein at the same time and unfold in a certain order. As the sprouting bamboo-seed contains in miniature the entire structure of the bamboo, as the mango blossom contains the stone, the pulp, the fibres, which appear separated and distinct in the ripe fruit, though from their excessive minuteness they are undistinguishable in the blossom, even such is the case with the fertilised ovum.

गर्भस्य हि सम्भवतः...सर्व्वाङ्गप्रत्यङ्गानि युगपत् सम्भवति इत्याह धन्वन्तरिः। गर्भस्य सूक्ष्मत्वात् नोपलभ्यन्ते वंशाङ्कुरवत् चूतफलवच्च तद्यथा चूतफले परिपक्वे केशरमांसास्थिमज्जानः पृथक् दृश्यन्ते कालप्रकर्षात्। तान्येव तरुणे नोपलभ्यन्ते सूक्ष्मत्वात्। तेषां केशरादीनां कालः प्रव्यक्ततां करोति एतेनैव वंशाङ्कुरोऽपि व्याख्यातः। एवं गर्भस्य तारुण्ये सर्व्वेषु अङ्गप्रत्यङ्गेषु सत्सु सौक्ष्म्यादनुपलब्धिः तान्येव फलप्रकर्षात् प्रव्यक्तानि भवन्ति। (Susruta, *Sârirasthâna*, Chap. III).

The inheritance of specific characters is explained in accordance with this view. Charaka assumes that the sperm-cell of the male parent contains minute elements derived from each of its organs and tissues. (Cf. Darwin's gemmule and Spencer's 'ids'). Sankara similarly states that the sperm-cell (or the seed in the case of a plant) represents in miniature every organ of the parent organism, and contains *in potentia* the whole organism that is developed out of it. (शरीरधात्वात्मा शुक्रभूतः अङ्गादङ्गात् सम्भवति। Charaka Sârirasthâna, Chapter IV, cf. Sankara on Brihadâranyaka.)

But if this is so, why are not congenital deformities of the parent, or constitutional diseases contracted in later life, invariably inherited? Congenital blindness, deafness, dumbness, stammering, lameness, or deformity of the spinal column or of the bony framework, or dwarfish stature, or constitutional diseases like madness, leprosy, or skin diseases in the parent, do not necessarily produce corresponding deformities or infirmities in the offspring. It cannot therefore be that the fertilised ovum represents in miniature every organ and tissue of the parental organisms. The solution of this difficulty Charaka ascribes to Âtreya. The fertilised ovum, it is true, is composed of elements which arise from the whole parental organism (समुदायात्मक, समुदायप्रभव), but it is not the developed organs of the parents, with their idiosyncracies or acquired characters, that determine or contribute the elements of the sperm-cell (or seed). The parental Vija (seed, germ-plasm) contains the whole parental organism in miniature (or *in potentia*), but it is independent of the parents' developed organs, and is not necessarily affected by their idiosyncracies or deformities. In fact, the parental Vija (seed, germ-plasm) is an organic whole independent of the developed parental body and its organs. In the parental Vija, an element representing a particular organ or tissue may happen (for this is accidental, दैव) to be defective or undeveloped, or otherwise abnormally characterised, and in this case the corresponding organ or tissue of the offspring will be similarly characterised. When constitutional diseases, acquired in later life, are found to be inherited, Âtreya would suppose that the Vija of the parent has been affected, and this would explain the fact of the inheritance. *In the case of leprosy, for example, it is transmitted to the offspring, only when the* germ-plasm (the Vija or the fertilised ovum) is infected with the virus of the disease by reason of the leprosy of the parent (*vide* Charaka's report of Âtreya's theory, Sârirasthâna).

एवमयं नानाविधानां एषां गर्भकराणां भावानां समुदायादभिनिर्वर्त्तते गर्भः। यद्ययमेषां नानाविधानां गर्भकराणां भावानां समुदयादभिनिर्वर्त्तते गर्भः कथमयं सन्धीयते। यदि चापि सन्धीयते कस्मात् समुदायप्रभवः सन् गर्भो मनुष्यविग्रहेण जायते मनुष्यश्च मनुष्यप्रभवः उच्यते। ....तत्र चेत् इष्टमेतत्यस्मात् मन्नुष्यमन्नुष्यप्रभवः तस्मादेव मनुष्यविग्रहेण जायते यथा

गौर्गोप्रभवः यथा चाश्वः अश्वप्रभवः इत्येवं । यदुक्तं अग्रे समुदायात्मक इति तदयुक्तं । यदि च मनुष्यः मनुष्यप्रभवः कस्मात् जडान्धकुब्जमूकवामनमिन्मथव्यङ्गोन्मत्तकुष्ठकिलासेभ्यो जाताः पितृसदृशा न भवन्ति *et seq.*..

यच्चोक्तं यदि च मनुष्यो मनुष्यप्रभवः कस्मान्न जडादिभ्यो जाताः पितृसदृशरूपा न भवन्तीति तत्रोच्यते यस्य यस्यहि अङ्गावयवस्य बीजे बीजभाव उपतप्तो भवति तस्य तस्य अङ्गावयवस्य विकृतिः उपजायते। नोपजायते च अनुपतापात् तस्माद् उभयोपपत्तिरप्यत्र । सर्वस्य च आत्मजानीन्द्रियाणि तेषां भावाभावहेतुर्दैवं । तस्मान्नैकान्ततो जड़ादिभ्यो जाताः पितृसदृशरूपा भवन्ति । (चरक शारीरस्थान तृतीयपरिच्छेद) दम्पत्योः कुष्ठबाहुल्याद् दुष्टशोणितशुक्रयोः । यदपत्यंतयोर्जातं ज्ञेयं तदपि कुष्ठितं ।

N. B.—The seventh tissue (the *Sukradharâ* kalâ, sperm-bearing or reproductive) contains the parental Vija, which is a minute organism (समुदायात्मक) deriving its elements from the parental organs, but distinct from the latter, and independent of their peculiarities, and it is the combination and characters of these constituent elements of the parental Vija in the reproductive tissue, that determine the physiological characters and predispositions of the offspring. We may call this Âtreya's *germ-plasm theory*, for it is an advance on the conception of gemmules and of ids, but in Âtreya's version, the germ-plasm is not only representative of the somatic tissues, but also generates and is generated by the latter. This mutual interaction of the 'germ-plasm' and 'somatic tissues' is a distinctive feature of Âtreya's hypothesis, the value of which will be differently estimated by different schools of biologists.

I may also add that the continued identity of the germ-plasm (बीज) from generation to generation, though it follows as a corollary from this doctrine of a distinct reproductive tissue, even when conceived to be affected by somatic processes, as Âtreya and Charaka conceive it to be, is nowhere expressly deduced. On the other hand, Âtreya and Charaka emphasise the influence of abundant or defective nutrition, and of the (chemical) constitution of the food, etc., on the characters of the Vija in the reproductive tissue, especially as regards the sexual character, the stature, and the colour pigment (वर्ण) of the offspring. But though the influence of nutrition on the Vija is thus freely admitted in a general way, it is expressly stated that the peculiar characters or idiosyncrasies of the elements that combine to form the Vija must be regarded as a matter of chance (दैव), in other words, the truly congenital variations are accidental.

SECTION 10.

THE SEX QUESTION.

Influence of nutrition on the ovum especially as regards the sex, stature and colour-pigment of the resulting offspring; In a general way, ghee and milk for the male, and oil and beans for the female parent, are favourable to the Vija. The sexual character of the offspring depends in part on a periodicity to which the life-history of the ovum in the female parent is conceived to be subject—a law of alternate rhythmic change (not unlike what we now know to regulate the development of several orders of bacteria or unicellular organisms), a law, under which the fertilisation of the ovum on the fourth day after the menstrual discharge, or on the alternate days succeeding, is favourable to the fœtus developing the male sexual character, and on the fifth, seventh, and alternate following days, to the fœtus assuming the female sex. The *Prayoga chintâmani* states that the latter occurs on even days, and the former on odd days. Another factor is the relative predominance of the sperm and the germ-cells in the fertilised ovum. Excess of the sperm-cell produces the male, that of the germ-cell the female. For male offspring of tall stature, fair complexion and energetic temperament, wheat pulp with honey, ghee (clarified butter), and milk should be taken by the female parent. Generally speaking, the adoption of the food, clothing, habits, of people of any particular clime are supposed to be favourable to the production of their characteristic stature and complexion. As to sex, the fœtus for a time remains indeterminate, and then takes on a definite male or female character, but before this stage is reached, the development of the sex can be modified to some extent by food and drugs (पुंसवनमौषधं). As for the colour-pigment, it is the animal heat (तेजोधातु) which is its source ; but where the *Âkâṣa* and *Ap*-particles predominate (in the food), the animal heat (of the metabolic processes) produces a fair complexion ; where earth and Vâyu particles predominate in the food, blackness is the result, and where the different *bhutas* are combined in nearly equal proportion in the food, the metabolic heat produces a dark pigment. In the later literature, ghee (clarified butter) habitually taken by the female during gestation is supposed to produce a fair complexion ; and rice (or wheat) and salads, a dark complexion. Charaka also holds that mental impressions of the parent are powerful factors in the determination of the characters of the offspring.

यथाहि बीजमनुपतप्तं उप्तं स्वां स्वां प्रकृतिं अनुविधीयते ब्रीहिर्वा ब्रीहित्वं यवोवायवत्वं तथा स्त्रीपुरुषौ अपि यथोक्तं हेतुविभागं अनुविधीयते ।......तस्मादापन्नगर्भां स्त्रियमभिसमीक्ष्य प्राग् व्यक्तीभावात् गर्भस्य पुंसवनमौषधमस्यै दद्यात् ।...स्नानात् प्रभृति युग्मेषु अहःसु संगमेतां पुत्रकामौ तौ अयुग्मेषु दुहितृकामौ ।...उपाचरेच्च मधुरौषधसंस्कृताभ्यां घृतक्षीराभ्यां पुरुषं स्त्रियन्तु तैलमाषाभ्यां । सा चेत् एवमाशासीत बृहन्तमवदातं हर्य्यक्षं ओजस्विनं शुचिं सत्त्वसम्पन्नं पुत्र मिच्छेयमिति । शुद्धस्नानात् प्रभृति अस्यै मधुसर्पिर्भ्यां संसृज्य श्वेतायाः गोः स्वरूपवत्सायाः पयसा आलभ्य राजते कांस्ये वा पात्रे काले काले सप्ताहं सततं प्रयच्छेत् पानाय ।......या येषां जनपदानां मनुष्यानां अनुरूपं पुत्रमाशासीत सा तेषां जनपदानां मनुष्याणां आहारविहारोपचारपरिच्छदान् अनुविधीयस्व इति वाच्या स्यात् ।

न खलु केवलमेतदेव कर्म्म वर्णाणां वैशेष्यकरं अपितु तेजोधातुरपि उदकान्तरीक्ष धातुः प्रायः अवदातवर्णकरो भवति । पृथिवीवायुधातुः प्रायः कृष्णवर्णकरः । समसर्वधातुः प्रायः । श्यामवर्णकरः । आधिक्ये रेतसः पुत्रः। कन्यास्यात् आर्त्तवेऽधिरक' ।

SECTION 11.

LIFE.

The question of the vital force or vital principle :—

These activities maintain the life of the organism, but what is this life itself ?

The *Chârvâkas* (materialists and sensationalists) answer that life (as well as consciousness) is a result of peculiar chemical combinations of dead matter (or the four elements) in organic forms, even as the intoxicating property of spirituous liquors results from the fermentation of unintoxicating rice and molasses. Similarly, the instinctive movements and expressions of new-born babes (sucking, joy, grief, fear, etc.) can be explained mechanically as due to external stimuli as much as the opening and closing of the lotus and other flowers at different hours of the day (or night), or the movement of iron under the influence of the loadstone. In the same way, the spontaneous generation of living organisms is frequently observed, *e.g.*, the case of animalcules which develop in moisture or infusions, especially under the influence of gentle warmth (स्वेदज, उद्भिज, दंशमशकादयः), or of the maggots or other worms which, in the rainy season, by reason of the atmospheric moisture, are developed in the constituent particles of curds and the like, which begin to live and move in so short a time.

(**Gotama**, in his *Sutras*, reports the Chârvâka explanation of instinctive emotional expressions in babes :—पद्मादिषु प्रबोधसम्मीलनवत् तद्विकार: Sutra 20, Ahnika 1, Chapter III, cf. the explanation of the movement preparatory to sucking;—अयसो ह्यस्कान्ताभिगमनवत् तदूपसर्पणं' Sutra 23, *ibid.* Jayanta, in the *Nyâya-manjari*, reports the Chârvâka explanation of consciousness (and life).

मदशक्तिवत् विज्ञानं । पृथिव्यादीनि भूतानि चत्वारि तत्त्वानि । तेभ्य एव देहाकारपरिणतेभ्यः मदशक्तिवत् चैतन्यमुपजायते ।

For spontaneous generation, *vide* Jayanta's report.

वर्षासुच स्वेदादिना अनतिदवीयसैव कालेन दध्याद्यवयवा एव चलन्तः पूतनादिक्रिमिरूपा उपलभ्यन्ते

(*Nyâya-manjari*, Ahnika 7, भूतचैतन्यपक्षः)

The Sânkhya view of consciousness—Reply to the materialists—

The intoxicating power in liquor is a force, *i.e.*, a tendency to motion, and this is the resultant of the tendencies (or subtile motions) present in the particles of the fermented rice, molasses, etc. A motion, or a tendency to motion, can in this way be the resultant of several other motions or tendencies. But consciousness (चैतन्य) is not a motion, and cannot be the resultant of (unconscious) natural forces or motions. Neither can the consciousness of the Self, or of the organism as a whole, be supposed to be the resultant of innumerable consciousnesses vested in the innumerable constituent particles of the body. One central abiding intelligence is a simpler and therefore more legitimate hypothesis than an assemblage of consciousnesses latent in different Bhutas or particles, cf. Vijnânabhiksu's comment on the Sutra. मदशक्तिवच्चेत् प्रत्येकपरिदृष्टे सांहत्ये तदुद्भवः (Sutra 22, Chapter III.)

ननु यथा मादकताशक्तिः प्रत्येकद्रव्यावृत्तिरपि मिलितद्रव्ये वर्त्तते एवं चैतन्यमपि स्यादिति चेन्न प्रत्येकपरिदृष्टे सति सांहत्ये तदुद्भवः सम्भवेत् । प्रकृते तु प्रत्येकपरिदृष्टत्वं नास्ति...ननु समुच्चिते चैतन्यदर्शनेन प्रत्येकभूते सूक्ष्मचैतन्यशक्तिरनुमेया इति चेन्न । अनेकभूतेषु अनेकचैतन्यशक्तिकल्पनायां गौरवेण लाघवादेकस्यैव नित्यचित्स्वरूपस्य कल्पनौचित्यात् । Cf. also भूतगतविशेषगुणानां सजातीयकारणगुणजन्यतया कारणे चैतन्यं विना देहे चैतन्यासम्भवात् । *ibid.*

मद्ये मदशक्तिर्न गुणः । मद्यारम्भकानां पिष्टगुडमध्व* दीनां यत् यस्य कर्म तैः कर्म्मभिरारब्धं स्वस्वकर्म्मविरोध कर्म्म यदुच्यते प्रभाव इति । चैतन्यादिकं न कर्म्म ।

(Vijnânabhiksu—*Pravachanabhashya*, Sutra, 22 Chapter III).

Cf. also Gangâdhara's *Jalpakalpataru*, (1867, Calcutta)—explaining the distinction between property (गुण) and power (प्रभाव), a technical term in medicine, which is a form of motion (कर्म्म) *Sutrasthâna*, Jalpakalpataru.

The Sânkhya view of Prâṇa (life) :—

Life, according to the Sânkhya, is not a *Vâyu* (biomechanical force) nor any mere mechanical motion resulting from the impulsion of Vâyu. The five vital operations, Prâṇa, Apâna, etc., are called *vâyus*, but this is only a metaphor. Life is in reality a reflex activity, a resultant of the various *concurrent* activities of the *Antahkaraṇas*, *i.e.*, of the sensori-motor (ज्ञानेन्द्रिय कर्म्मेन्द्रिय), the emotional (मन:) and the apperceptive reactions of the organism (for some add अहङ्कार)

Vijnânabhikṣu notes that this explains the disturbing (elevating or depressing) effect, on the vitality, of pleasurable or painful emotions like love (काम), which are activities of *Manas*, one of the *Antahkaraṇas* concerned in the reactions of the living organism. On the Sânkhya view, then, *Prâṇa* or life is not a Vâyu, nor is it evolved from the Bhutas, inorganic matter. Prâṇa is only a complex reflex activity (सम्भयैका वृत्ति) resulting from the operations of the psycho-physical principles or forces in the organism. (*cf.* **Sankara**

reporting the Sânkhya view—करणानि नियतवृत्तयः सन्तः सम्भूयैकां प्राणाख्यां वृत्तिं प्रतिपद्यन्ते । *Sârîraka-bhâṣya*, Chapter II, Pada 4, Sûtra 9) सामान्यकरणवृत्तिः प्राणाद्या वायवः पञ्च । (Isvarakriṣṇa, Kârikâ).

Also Sûtra 31, Chapter II, where Vijnânabhikṣu notes :—

वायुवत् सञ्चारात् वायवः प्रसिद्धाः । अस्माकं नायं नियमः यदिन्द्रियवृत्तिः क्रमेणैव भवति नैकदा । जातिसाङ्कर्यस्य अस्माकं अदोषत्वात् । सामग्रीसमवधाने सति अनेकैरपीन्द्रियैः एकदैकवृत्त्युत्पादने बाधकं नास्ति । Vijnânabhikṣu, *Pravachana-bhâṣya*, Chapter II, Sutras, 31, 32. मनोधर्म्मस्य कामादेः प्राणक्षोभतया सामानाधिकरण्येनैव औचित्यात् । *ibid.*

The Vedântic view of Prâṇa.

The Vedântists are believers in an independent vital principle. They agree with the Sânkhyas in holding that *Prâṇa* is neither a *Vâyu*, nor the operation of a Vâyu. But neither is Life a mere reflex or resultant of concurrent sensori-motor, emotive and apperceptive reactions of the organism. You may put eleven birds in a cage, and if they concurrently and continually strike against the bars of the cage in the same direction, the cage may move on under this conjoint action. But the sensory and motor activities cannot in this way originate the vital activity of the organism. For the deprivation of anyone or more of the senses does not mean a deprivation of life, and above all there is this radical distinction : there is sameness of kind (समतीयत्व) between the motions of the individual birds and the resultant motion of the cage, but the sensations do not explain life. *Life* (Prâṇa) must therefore be recognised as a separate principle, just as the *Manas* and the *Antahkaranas* generally are in the Sânkhya Philosophy. Life is a sort of subtle rarefied 'ether-principle' (अध्यात्मवायु) pervasive of the organism,—which is not gross Vâyu, but is all the same subtilised matter, like the Manas itself, for, in the Vedânta, everything other than the Self (आत्म) is "material" (जड़)

This Life is prior to the senses, for it regulates the development of the fertilised ovum which would putrefy if it were not living, and the senses with their apparatus develop subsequently out of the ovum (न वायुक्रिये पृथगुपदेशात्) Chapter II, Pada 4, Sutra 9, *vide* Sarîraka Bhâṣya Sankara,—also, Vâchaspati Misra, Bhâmatî :—

सिद्धान्तस्तु न सामानेन्द्रियवृत्तिः प्राणः । स हि मिलितानां वा वृत्तिर्भवेत् प्रत्येकं वा । न तावत् मिलितानां । एकद्वित्रिचतुरिन्द्रियाभावे तदभावप्रसङ्गात् । नो खलु चूर्णहरिद्रासंयोगजन्मारुणगुणस्तयोरन्यतराभावे भवितु मर्हति । न च वहुविष्टिसाध्यं शिविकोद्वहनं द्वित्रिविष्टिसाध्यं भवति । न च त्वगेकसाध्यं । तथा सति सामान्यवृत्तित्वानुपपत्तेः । अपि च यत् सम्भूयकारकाणि निष्पादयन्ति तत् प्रधानव्यापारानुगुणावान्तरव्यापारेणैव । यथा वयसां प्रातिस्विको व्यापारः पिञ्जरचालनानुगुणः । इहतु श्रवणाद्यवान्तरव्यापारोपेतः प्राणा न सम्भूय प्राण्युरिति युक्तं प्रमाणाभावादत्यन्तविजातीयत्वाच्च श्रवणादिभ्यः प्राणनस्य । * * * तस्मादन्यो वायुक्रियाभ्यां प्राणः । *** वायुरेवायमध्यात्ममापन्नः मुख्योऽपि प्राणः । Sankara, *ibid. Cf.* also, ज्येष्ठश्च प्राणः शुक्रनिषेककालादारभ्य तस्य वृत्तिलाभात्। नचेत् तस्य तदानीं वृत्तिलाभः स्यात् शुक्रं पूयेत न सम्भवेद्वा श्रोत्रादीनान्तु कर्णशष्कुल्यादिस्थानविभागनिष्पत्तौ वृत्तिलाभान्न ज्येष्ठत्वं । Sankara, on Sutra 9, Pada 4, Chapter II.

APPENDIX D.

HINDU IDEAS ON MECHANICS (KINETICS).

SECTION 1.

ANALYSIS OF MOTION.

In his Bhâṣya on the Vaiśeṣika Aphorisms written probably in the third or fourth century of the Christian era, if not earlier, Praśastapâda begins the Section on Motion (कर्म्म ग्रन्थ) with the definition of *karma* (motion, lit. work) as the unconditional cause of conjunction and disjunction, *i.e.*, of change of place in a particle (संयोग विभाग निरपेक्ष कारणं). He regards Karma (motion) as instantaneous (क्षणिक) in its simplest form, distinguishing it from *Vega* (impressed motion, momentum) which is a persistent tendency, Sanskâra, and implies a series of motions. Accordingly in one and the same particle, there can be only one motion (karma) at any given moment, since its change of place at that moment is one and definite (एकदा एकस्मिन् द्रव्ये एकमेव कर्म्म वर्त्तते। प्रशस्तपादभाष्य, कर्म्म पदार्थनिरूपणं). The supposition of two (instantaneous) motions in the same particle is superfluous. They may be so opposed as to neutralise each other, in which case the particle would be at rest. If they are not so opposed, and motion (*i.e.*, an instantaneous change of place) follows, then, since this change of place is a definite change, one motion would be sufficient to account for it, and the hypothesis of two motions would be meaningless (अथ अविरुद्धकर्म्मद्वयसमावेशः तदा एकत्वादेव उपपत्तेः द्वितीय कल्पनानैरर्थ्यम् - Prasastapâda). One and the same motion can affect only one particle, as the changes of place of different particles must be different (एकं कर्म्म न अनेकत्र वर्त्तते — *Ibid.*)

Now motion is always marked by a certain direction (दिग्विशिष्टकार्य्यारम्भकत्वस्य विशेषः):

(i) The successive motions of a particle may be in the same direction (rectilinear) *e.g.*, (*a*) upward or downward vertical motion, as in throwing upwards or downwards in the case of objects moved by volition directly or indirectly (उत्क्षेपणं, अपक्षेपणं), or (*b*) other forms of rectilinear motion, contraction, dilation (आकुञ्चनं, प्रसारणं) ;--

or (ii) the directions of the successive motions may be different as in curvilinear motion (यदनियत दिक्प्रदेश संयोगविभागकारणं तद्गमनं), *e.g.*, भ्रमण (rotatory motion), स्पन्दन (vibratory motion), etc. All these are varieties of Gamana (गमन, curvilinear motion) (उत्क्षेपणादिशब्दैः अनवरुद्धानां भ्रमणपतनस्पन्दनादीनां अवरोधार्थं गमनग्रहणं कृतम्.—*Ibid* – cf. Sankara Misra, गमनत्वं च जातिविशेषः भ्रमणरेचनस्यन्दनोर्द्ध्व ज्वलनन मनोगमनादिष्वपि). In another sense, all kinds of motion in material (inanimate) objects, whether rectilinear or curvilinear, are called Gamana (गमन).

(एतत् पञ्चविधमपि कर्म्म शरीरावयवेषु च तत् सम्बद्धेषु तत् प्रत्ययं असत् प्रत्ययं च। यत् अन्यत् अप्रत्ययमेव तेषु अन्येषु च तत् गमनमिति Praśastapâda, कर्म्मग्रन्थ)।

Single particles, then, may have a serial motion when particles (अवयवाः) combine to form a body (अवयवी), they may move continuously in a straight line, in which case the body is said to move in that direction (अवयविक्रियाया यावदवयवक्रिया नियतत्वात् the action of a composite whole is determined by the action of the constituent parts taken together). But different particles may move in different directions, or again, the particles may have a curvilinear motion, and in such cases it appears as if different motions are impressed on the body, *e.g.*, the falling leaf driven by the wind may have a rotatory or vibratory motion (भ्रमण, स्पन्दन) and a vertical downward motion (पतन) at the same time. Here each particle of the leaf taken separately has only one motion or change of place at the same moment, but from the point of view of the observer द्रष्टा, the particles *have a rotatory or vibratory motion in one relation, and the leaf as a whole has a downward motion in another relation. The motion at any instant is really one, but for convenience of analysis we consider the rotatory change of place as separate from the change of place in the downward direction,* एकस्मिन् कर्म्मणि युगपत् द्रष्टृणां भ्रमणपतनप्रवेशन प्रत्यया कथं भवन्ति । अत्र तु न अवयवावयविनो दिग्विशिष्टसंयोग विभागानां भेदात्—*Ibid.*

SECTION 2.

MOTION CONSIDERED IN RELATION TO ITS CAUSES.

Various kinds of motion are observed :—

I. Movements which are not caused by contact with matter :—

(1) Movements caused by volition (प्रयत्न) *e.g.*, the movement of the hand.

(2) Movement, as of a falling body. This is caused by gravity (गुरुत्व) which in the astronomical treatises of Âryabhata, Brahmagupta and Bhâskara, is ascribed to the attraction (आकर्षण, pulling force) exercised by the Earth on a material body. The force of gravity may be counteracted by volition (विधारक, प्रयत्न) as in holding of the hand, or by contact, as when a body rests on a support, or by *vega* (वेग), impressed motion, as in the flying arrow which is kept from falling by the motion impressed on it.

(3) Motion of fluids, as the downward flow in a stream (स्यन्दन). This is due to fluidity (द्रवत्व) which is a characteristic property of certain kinds of atoms, in some cases original, in others produced by the contact of these atoms with the atomic particles of heat (*e.g*, in the fire). But Sankara Misra points out that this property, fluidity, is only a concomitant condition (असमवायिकारण), the efficient cause (निमित्तकारण) is even in this case gravity (गुरुत्व) in the particles of the fluid. यत्तु दूर संसरणंस्यन्दनं तत् द्रवत्वात् असमवायि कारणात् उत्पद्यते, गुरुत्वात् निमित्तकारणात् असमवायिकारणेषु. (Sankara Misra, Upaskâra, on Sutra 4, Ahinka 2, Chap. V, of the Vaiśeṣika Sutras).

(4) Certain motions, not due to material contact, of which the mechanical causes are unknown and which may be ascribed to the universal final cause, Adriṣta (अदृष्ट,) *e.g.*, the first motion in atoms at the beginning of creation, the upward motion of fiery particles or atoms, and the oblique motion of gaseous particles, *vâyu*, (वायु), the movement of iron towards the magnet, capillary motion (अभिसर्पण) as of liquid particles from the root to the stem of a plant. The upward motions (आरोहण) of water-particles in evaporation and in boiling do not require the hypothesis of Adriṣta, as these are caused by the pressure of heat corpuscles (तेजः परमाणु) and the contact with air particles (नोदनापीडनात् संयुक्तसंयोगाच्च—Vaiśeṣika Sutra, Chap. V, Ahnika 2).

MEANING OF ADRIṢTA (अदृष्ट)

Adriṣta (lit. unseen) stands for 'unknown cause' or 'unexplained Nature' in the *earlier Vaiśeṣika writers. Several classes of cases falling under* Adriṣta are distinguished, *e.g.*

(1) the operation of merit and demerit (धर्म्म) and (अधर्म्म), a transcendental cause, which has to be posited in explaining the conjunctions and disjunctions of souls with their organic vehicles (bodies), which cannot be ascribed to natural causes, but presuppose the law of karma, or the operation of moral causation, as super-imposed on the natural order,

(2) various kinds of motion, in the different classes of elements, *e.g.*, their natural modes of operation, such as the dispersion of Vâyu (air, gas), the upward motion of fire, the attraction of the needle by the magnet, etc., motions which serve the ends

of Creation and of created beings (उपकारकं अपकारकं). Such natural properties must be ascribed to Adrista, final causality (उपकारापकारसमर्थं अदृष्टकारितं), provided the *cause cannot be ascertained by observation or inference.*

1. लब्धवृत्तिभ्याम् धर्म्माधर्म्माभ्याम् कर्म्मोत्पद्यते—*Ibid.* अपसर्पणकर्म्म उपसर्पणकर्म्म, etc.

2. एवमन्यदपि महाभूतेषु यत्प्रत्यक्षानुमानाभ्यामनुपलभ्यमानकारणं उपकारापकारसमर्थं च भवति तदपि अदृष्टकारितं—*Ibid.*

Jayanta in the Nyâya-Manjari notes that Adrista is resorted to in explanation of observed phenomena only when these cannot be derived in any way from the operation of known causes—यदि अदृष्टमन्तरेण दृष्टं न सिद्ध्यति काममदृष्टं कल्प्यताम् अन्यथा अपितु तदुपपत्तौ किं तदुपकल्पनेन। दृष्टसिद्धयेहि अदृष्टं कल्प्यत्वे नतु दृष्टविघाताय। न्यायमञ्जरी—Ahnika I.

Similarly, Jayanta notes that, when anything is put down as natural (स्वाभाविक), we may mean either that it has no cause or no uniform cause, or no known cause. Of these, the first two alternatives must always be dismissed. And 'natural' can only mean something of which no cause has yet been ascertained (स्वाभाविकं नाम किमुच्यते किमहेतुकं अविज्ञातहेतुकं अनियतहेतुकं वा। न तावदहेतुकं कार्य्यं सम्भवति............नापि अनियतहेतुकं कार्य्यं किञ्चिदस्ति – न्यायमञ्जरी – – चार्वाकमतनिरास।

This sound interpretation of Adrista was afterwards obscured. In modern writers of the Nyâya-Vaisesika School, physical and mechanical ideas have suffered a set-back, and even the formation of the hailstone is ascribed to the operation of moral causes (धर्म्माधर्म्म).

II. We come now to motions produced by contact (संयोग). Such motions may be classed as follows, according to the nature of the contact originating them:—

(1) Motion due to direct contact with a body exercising continued pressure (नोदन) *e.g.*, the motion of an object pushed or pulled by the hand, the motion of the mud under heavy stones, the motion of the arrow due to the pressure exercised by the bowstring, the motion of the bowstring due to the pressure of the elastic bow as it recovers its original shape, the motion of clouds, of volumes of dust, of balloons, sailing vessels, and other vehicles, under the impelling force (pressure, नोदन: प्रेरण) of the wind, etc. वायुर्मेघादिप्रेरणधारणादि समर्थः (Prasastapâda, वायुनिरूपण—मेघादीत्यादिपदेन यानपोतादिपरिग्रहस्तेषामपि वायुना प्रेर्य्यमाणत्वात्। Sridhara मेघादीति आदिग्रहणात् वैहायसानां विमानादीनां (balloons in the sky) भौमादीनां च पानपात्रपांशुपटलादीनां जलानलयोश्च परिग्रहः (Udayana, Kiranâvali, वायुनिरूपणम्)

N.B. Udayana makes a similar reference to balloons filled with gas or smoke (धूमापूरित चर्म्मपुटकं) in discussing the opinion that air has weight (Kiranâvali, वायुनिरूपणम्) These passages show that balloons were known in Udayana's time (974 A. D.—*vide* उदयन, Laksanâvali).

(2) Motion due to direct contact for an instant with a body that strikes and produces an impact (अभिघात) *e.g.*, in the cases of a stone falling against a hard object (पाषाणादिषु निष्ठुरेःवस्तुनि अभिपतितेषु --Sridhara), the potter's rod striking the wheel, the mortar struck against the pestle. Instantaneous disjunction is necessary to impact. If there is continued contact, the result is pressure (नोदन,). In some cases there may be disjunction (*i.e.*, a rebound) after continued pressure (यत्र अभिघातकं द्रव्यं भूप्रदेशं अभिहत्य किञ्चिदधो नीत्वा उत्पतति-श्रीधर—न्यायकन्दली).

(3) Motion due to direct contact with an elastic body which exercises a moving force by means of its elasticity (स्थितिस्थापकत्व) in the act of restitution of the original form, (यथा स्थितं स्थापयति) e g., the motion of the bow-string due to the force exercised by the piece of bamboo (the bent bow). This force of restitution in an elastic body is a kind of sanskâra,

i.e., persistent tendency (धनुशाखाश्रृङ्गदन्तास्थि सूत्रावस्त्रादिषु भुग्नसम्वर्त्तितेषु स्थितिस्थापकत्वकार्य्यं संलक्ष्यते—प्रशस्तपादभाष्य bows, twigs, tooth-bones, horn, thread, cloth, etc., are noted as elastic).

(4) Motion due to contact with a body which is itself in contact with another which possesses Vega (impressed motion or momentum). (वेगवद्द्रव्यसंयुक्तसंयोग) This is the fact of the transmission of pressure or moving force, and the consequent production or communication of motion, as for example, in the pulling of an object by means of a string, the pushing of the potter's wheel by the potter's rod, etc.

SECTION 3.

CAUSE OF MOTION, OR FORCE.

Force is of the following kinds :—

1. Continued pressure (नोदन)
2. Impact (अभिघात).
3. Persistent tendency (संस्कार) of which there are two kinds—(*a*) Vega (वेग impressed motion, momentum), the persistent tendency to motion in a moving body, and (*b*) the tendency to restitution of shape in an elastic body (स्थितिस्थापकसंस्कार).

   N. B.—The metaphysical *sanskâra* (भावना) is here omitted.

4. Transmitted force, as in pulling by a string, pushing by a rod, etc.
5. Gravity.
6. Fluidity.
7. Volition.
8. Adrista, comprising various unknown agencies.

In every case of motion produced by contact, Vega is a contributary cause, as the body originating the motion must possess Vega (impressed motion, momentum).

The concept of Vega (वेगाख्य संस्कार).

A motion (karma) being conceived as a change of place in a particle is held to be incapable of producing another motion ; but the pressure, impact or other force which produces the first motion produces through that motion a *sanskâra* or persistent tendency to motion (*vega*), which is the cause of continued motion in a straight line, *i.e.*, in the direction of the first motion (नियतदिक् क्रिया प्रबन्धहेतु: यत् दिगाभिमुख्येन क्रियावेगो जन्यते तत् दिगभिमुखतयैव क्रिया सन्तानस्य हेतुरिति—श्रीधर, न्याय-कन्दली संस्कारनिरूपणम्)

The Vaiśeṣikas accept one *sanskâra* (impressed motion, momentum) lasting till the cessation of the motion. Udyotakâra and other writers of the Nyâya School suppose a series of *sanskâras*, each generating the one that succeeds it. (संस्कारेण उत्तरोत्तरकर्म्मसन्तानो जायते स्वजन्योत्तरसंयोगेन कर्म्मणि नष्टे संस्कारेण कर्म्मान्तरजननात् एक एव संस्कार: कर्म्मसन्तानजनक: नतु कर्म्मसन्तानवत् संस्कार-सन्तानोऽपि अभ्युपगन्तुमुचित:— शङ्करमिश्र). It will be seen that the Nyâya view is adequate to explain acceleration which it logically implies. The force of *sanskâra* (शक्ति) diminishes by doing work (कार्य्यकरणात्) against a counteracting force, and when the *sanskâra* is in this way entirely destroyed, the moving body comes to rest (संस्कारो यावत्–पतनमनुवर्त्तते । यथा यथा चास्य कार्य्यकरणात् शक्ति: क्षीयते तथा तथा कार्य्यमन्दतरतमादिभेदभिन्नमुपजायते —श्रीधर–न्याय-कन्दली–कर्म्मग्रन्थ)-Vega, it will be seen, corresponds to inertia in some respects, and to momentum (impressed motion) in others. This is the nearest approach to Newton's First Law of Motion in the Vaiśeṣika theory of motion.

Vega (impressed motion), or this tendency to move on in a straight line, is counteracted by contact with tangible objects (स्पर्शवद्द्रव्यसंयोग), *e.g*, by impact or friction (including friction with the still atmosphere (स्तिमितवायु), as in the case of the arrow).

Vega (momentum) produces work in opposition to the resisting force, and thereby becomes weaker and weaker (मन्दतर मन्दतम) until it comes to an end. (तत्र वेगो मूर्त्तिमत्सु पञ्चसु द्रव्येषु निमित्तविशेषापेक्षात् कर्म्मणा जायते, नियत-दिक्-क्रिया-प्रबन्धहेतुः स्पर्शवद्द्रव्यसंयोग-विशेषविरोधी Prasastapâda, संस्कार निरूपणम्—मन्दस्तु वेगः स्पर्शवद्द्रव्यसंयोगमात्रेण विनश्यति यथा अतिदूरगतस्य इषोः स्तिमितवायु-प्रतिबद्धस्य-श्रीधर, संस्कारनिरूपणम्)

Causes of Pressure (नोदन) *and of Impact* (अभिघात).

Pressure is produced by contact acting in conjunction with Vega (impressed motion), elasticity, gravity, fluidity or volition ; *e.g.*, the Vega of the wind produces pressure (नोदन) on the grass, that of a current of water on the reed, that of the bowstring on the arrow. Gravity with contact produces pressure, as when the earth sinks under a heavy load.

Impact is produced by contact with a body possessing Vega (impressed motion) where the contact is instantly followed by disjunction (or rebounding). If the contact continues, the result is pressure (नोदन) (तत्र नोदन गुरुत्व-द्रवत्व-वेग-प्रयत्नान् समस्त-व्यस्तान् अपेक्षमाणः यः संयोग-विशेषः नोदनं अविभाग-हेतुः एकस्य कर्म्मणः कारणं तस्मात् चतुर्ष्वपि महाभूतेषु कर्म्म भवति.........वेगापेक्षो यः संयोग-विशेषः विभागहेतुः एकस्य कर्म्मणः कारणं स अभिघात तस्मादपि चतुर्ष्व-महाभूतेषु कर्म्म भवति—प्रशस्तपाद-भाष्य).

It is expressly noted that the four elements, earth, water, air and fire, are all subject to the forces of pressure and impact. Pressure and impact may be of different degrees (तीव्रमन्दादिभेद). So also *vega* (impressed motion, momentum.)

Illustrations of Combination of Forces.

(1) Pressure acting concurrently with impressed motion or *vega*, as when the moving hand possessing Vega throws the quoit or a projectile. (पाणिमुक्तेषु गमनविधि :) ततः संस्कारनोदनाभ्या तावत् कर्माणि भवन्ति यावत् हस्ततोमर-विभाग इति—प्रशस्तपादभाष्य.)

Similarly, in the case of the bowstring impelling the arrow, or the potter's wheel impelled by the rod, the first motion is due to pressure (नोदन), and results in a *sanskâra* (persistent tendency to motion, impressed motion or momentum), but the subsequent motions are produced by the pressure acting concurrently with the *sanskâra* (impressed motion) (तस्मात् संस्कारात् नोदन-सहायात् तावत् कर्म्माणि भवन्ति यावत् इषुज्या-विभागः—प्रशस्त-पाद, कर्म्मग्रन्थ —प्रथमं चक्रावयविनि दण्डसंयोगात् कर्म्म उत्पद्यते उत्तरोत्तराणि कर्म्माणि अभिघातात् कर्म्मजात् संस्कारात् च भवन्ति दण्डविगमे तु चक्रं तदवयवेषु च संस्कारादेव केवलात् । श्रीधर न्याय-कन्दली, कर्म्म ग्रन्थ)

(2) Impact (अभिघात) with impressed motion (संस्कार), as when the mortar thrown by the hand rebounds after striking the pestle (संस्कारापेक्षात् अभिघातात् मुसले उत्पतन-कर्म्म —प्रशस्तपाद भाष्य).

(3) Pressure (नोदन) acting concurrently with impact (अभिघात), as when the mud sinks when we strike against the ground with the feet. Here, if the feet be not in contact with the mud, but only with the surrounding ground, there is transmitted force (संयुक्त संयोग).

(पदादिभिर्नुद्यमानायमभिहन्यमानायाम् वा पंकाख्यायां पृथिव्यां यत् संयोगोनोदनाभिघातयोरन्यतरापेक्षो उभयापेक्षो वा स संयुक्तसंयोगः तस्मादपि पृथिव्यादिषु कर्म्म भवति । Prasastapâda).

(4) Gravity concurrently with *sanskâra* or persistent tendency, as in the case of a falling body in the second and following instants. Also the case of a stone thrown against the mud, where gravity (the weight of the stone) combines with the Vega of the stone to produce motion in the mud (Prasastapâda). (आद्यं कर्म्म गुरुत्वात् भवति तेन कर्म्मणा संस्कारः क्रियते तदनन्तरं उत्तर-कर्म्माणि गुरुत्वसंस्काराभ्यां जायते द्वयोरपि प्रत्येकं अन्यत्र सामर्थ्यावधारणात्—श्रीधर, न्याय-कन्दली, कर्म्म ग्रन्थे सत्प्रत्यय-कर्म्मनिरूपणम्). This case will be further noticed below.

Udyotakâra, the commentator on the Nyâya-Bhâsya, states that a heavier body falls to the ground with greater Vega (and velocity) than one that is lighter. Udyotakâra also holds, and Sridhara agrees with him, that the gravity (गुरुत्व) of a body (अवयवी) as a whole composed of particles (अवयवा:) is not the same as the sum of the gravities of the particles. There is a difference in amount which is, however, so small as to be imperceptible. The concept of mass in the New Mechanics of Lorenz may lend some countenance to this curious metaphysical speculation. (Sridhara, गुणग्रन्थ, गुरुत्वनिरूपणम्).

(5) Volition acting concurrently with gravity, as in lifting the hand. This is accompanied by transmission when an object (*e.g.*, the quoit) is lifted by the hand.

Sanskâra (impressed motion, momentum) with or without pressure (नोदन) or impact (अभिघात) may be transmitted (दण्डसंयुक्तस्य अवयवस्य उत्तरोत्तरकर्म्माणि संस्कारात् नोदनाच्च अपरेषां संस्कारात् संयुक्तसंयोगाच्च Sridhara).

Composition of Gravity with Vega (momentum).

When a body is let go and falls to the ground, the force acting on it is gravity (गुरुत्व) which the astronomers ascribe to the attraction of the Earth. Motion is produced in the first instance by gravity alone, and this leads to a *sanskâra* (impressed motion) in the same direction. But the force of gravity continues to operate, so that, in the moments following the first, the motion is due to gravity as well as *sanskâra*. The resultant motion is one, but both the causes must be conceived as contributing to the resultant. The reason for supposing this combined action is that both gravity and *sanskâra* (impressed motion or momentum) are seen elsewhere to produce motion separately.

In the case of the falling body, therefore, there is the composition of the two, gravity and vega, acting in the same direction (उभयसमावेश:) from the second instant onwards. It is as if two motions coalesced and resulted in one.

Here a good foundation is laid for the explanation of the accelerated motion of falling bodies, but Galileo's discovery was not anticipated, as Galileo's observations and measurements of motion were wanting (आद्यं कर्म्म गुरुत्वात् भवति तेन कर्म्मणा संस्कार: क्रियते तदनन्तरं उत्तरकर्म्माणि गुरुत्व-संस्काराभ्याम् जायन्ते द्वयोरपि प्रत्येकं अन्यत्र सामर्थ्यावधारणात्— श्रीधर, कर्म्मग्रंथ — तत्र आद्यं गुरुत्वात् द्वितीयादीनि तु गुरुत्व-संस्काराभ्याम् , प्रशस्तपाद, कर्म्मग्रन्थ ।)

But in the case of the flying arrow or other projectile, the impulsive force which produces *vega* counteracts the force of gravity; in the end, this *vega* is lost through friction with air, and then gravity (गुरुत्व) brings the arrow to the ground. The meaning of this "counteraction" is not clear. Is it intended that the action of gravity is suspended as long as the *vega* continues? We have seen that, in the case of a body let fall, Prasastapâda expressly states that gravity (गुरुत्व) and *sanskâra* (*vega*, momentum) both act in the second and following instants. Prasastapâda seems to have thought that some *sanskâras* (*e.g.*, the *vega* of an arrow or other projectile) suspend the action of gravity (गुरुत्वं संयोग-प्रयत्न संस्कारविरोधि, Prasastapâda, गुणग्रन्थ । वेगेन प्रतिबन्धात् अपतनं बहिर्क्षिप्तस्य शरशलाकादे: निवृत्ते नोदने कर्म्माणि उत्तरोत्तराणि इषु-संस्कारादेवापतनादिति Prasastapâda, Sridhara, कर्म्मग्रन्थ). Other *sanskâras* (*e.g.*, in the case of a falling body) coalesce with gravity to produce a single resultant motion. The later commentators (from Sridhara downwards) certainly interpret the Vaisesika Sutras in this sense.

Motion of a particle in the case of a composition of forces.

Any number of motions or *vegas* may be impressed on a particle, but so long as these are in a uniform direction (नियतदिग्विशिष्ट) the resultant motion or *vega* is in a straight line and may be conceived as one. (द्वितीयकल्पना-वैयर्थ्यम् Prasastapâda, कर्म्मग्रन्थ). It is only when we come to Gamana (curvilinear motion) and its causes that the question of composition assumes a real significance. In all such cases, each separate particle has only one Vega (impressed motion) in a definite direction (नियतदिगाभिमुख्य) at any given instant, but the composition of the successive motions and Vegas in the same particle produces the curvilinear motion (गमन) *e.g.*, the rotation of each constituent particle of the potter's wheel. The motion of the body (अवयवी *e.g.*, the wheel) results from the combined motions of the particles (अवयवाः). If pressure or impact produces motion in an opposite direction to the Vega already impressed on the body, the original direction would be changed, as is seen in the case of rebounding (उत्पतन) after impact (अभिघात). The mortar rebounding after striking the pestle is a typical instance of such change of direction in Vega or motion. The impressed force, *e.g.*, impact (अभिघात), produces a changed motion in a different direction. One view is that the original Vega (momentum) is destroyed before a new motion and a new Vega are produced by the impact. Others hold that the impact does not destroy the original Vega (momentum), but conjointly with it produces the changed motion and, through such motion, a changed Vega in a new direction. (उलूखलमुसलयोरभिघाताख्यः संयोगोमुसलगतवेगमपेक्षमाणः मुसले उत्पत्तेन कर्मकरोति यद्यपि प्राक्तनसंस्कारो विनष्टः तथापि मुसलोलूखलयोः संयोगःपटुकर्म्मोत्पादकः तस्य संस्कारारम्भ साचिव्यसमर्थो भवति अथवा प्राक्तन एव पटु संस्कारः अभिघातात् अविनश्यन् अवस्थित इति *et seq.* Praśastapâda, कर्म्मग्रन्थ).

Typical cases of curvilinear motion (Gamana).

Vortical Motion :—This is due to the contact of two bodies moving in opposite directions with a like or equal Vega, *e.g.*, two currents of air or water meeting from opposite directions. The change of direction is seen in the fact that water which flows downwards, or air which moves obliquely, may receive an upward motion as the result of such collision. (अथ किमिदं संमूर्च्छनं नाम। समानजवयोः (तुल्ययोगयोः) वाय्वोर्विरुद्ध-दिक्क्रिययोः सन्निपातः Praśastapâda, वायुनिरूपणं). The Scholiast Udâyana adds : वाय्वोरितिप्रकृतत्वेन स्पर्शवतोरिति तु विवक्षितम्। अपां यथा द्रव्यान्तरसंमूर्च्छनात् ऊर्द्ध्वगमनं परस्पराभिहतनदीपयः— उदायन द्रव्यकिरणावली. Sridhara notes :—तिर्य्यग्गति स्वभाव-द्रव्योर्द्ध्वगतित्वात् परस्पराभिहत जलतरङ्गोर्द्ध्वं गमनवत् असमानवेगयो संमूर्च्छनं न भवति एकेन अपरस्य विजयात्—Sridhara).

Vibratory motion (कम्पन, स्वन्दन)

This will be analysed in the chapter on Acoustics.

Rotatory motion (भ्रमण).

Each particle of the rotating body, *e.g.*, the potter's wheel (चक्र), has, at any given instant, a motion in a definite direction. The rotatory motion of the body results from the separate motions of the particles, and their persistent tendencies (संस्काराः), joined with the fact of the rigid conjunction of the particles. When the rod strikes one part of the wheel, the motion in the part struck is in the first instant produced by impact (अभिघात,) ; while the other parts move through the transmission of force due to the rigid cohesion of parts. The subsequent motions in the part struck are due to continued pressure (नोदन) and the persistent tendency (संस्कार) set up by the first motion ; while the subsequent motions in the other parts are explained by their own persistent tendencies and the transmission due to rigid cohesion. When the rod is disjoined from the wheel, the rotatory motion continues, being due merely to the persistent tendencies in the constituent parts and the resultant persistent tendency in the whole.

Other varieties of curvilinear motion in bodies are to be similarly explained (*i e.*, by the composition of Vegas) (तथा चक्रादिषु अवयवानाम् पार्श्वतः प्रतिनियतदिग्देशसंयोगविभागोत्पत्तौ यदवयविनः संस्काराद्नियतदिग्देशसंयोगविभागनिमित्तं कर्म्म तद्भ्रमणमिति। एवमादयो गमनविशेषाः—Prasastapâda—कर्म्मग्रन्थ। एवं वेगात् दण्डसंयोगचक्रावयवे आद्यं कर्म्म दण्डसंयोगात्। अवयवान्तरेषु च संयुक्तसंयोगात् दण्डसंयुक्तस्य अवयवस्य उत्तरोत्तरकर्म्माणि संस्कारात् नोदनात् च। अपरेषां संस्कारात् संयुक्तसंयोगात् च दण्डविगमेतु चक्रे तदवयवेषु च संस्कारादेव केवलात् एवमादयो गमनविशेषाः—Sridhara).

SECTION 4.

MOTION OF FLUIDS.

Current motion (स्यन्दन, downward flow in a stream), upward motion (आरोहण, *e.g.*, evaporation, boiling, etc.), and capillary motion (अभिसर्पण, as in plants and porous vessels) are three varieties of fluid motion which require explanation. To this may be added vortical motion (संमूर्च्छन), and (स्यन्दन) wave motion which will be noticed in the chapter on Acoustics.

1. Current Motion स्यन्दन

This is conditioned by fluidity in particles, but Sankara Misra notes that in the downward flow of water, gravity in the fluid particles is the efficient cause (गुरुत्वात् निमित्त-कारणात् असमवायि-कारणेषु – Sankara Misra, उपस्कार). When the water is enclosed on all sides, as in a vessel, the downward flow (स्यन्दन) is counteracted. Here the fluidity does not produce motion, because, in the case of the particles in contact with the enclosing body, there is the resistance (प्रतिबन्ध) of the latter, which is transmitted to the other particles, and this counteracts the fluidity (स्रोतो भूतानामपां स्थलान्निम्नाभिसर्पणं यत् तत् द्रवत्वात् स्यन्दनं कथं समन्तात् रोध: संयोगेन अवयविद्रवत्वम् प्रतिबद्धं उत्तरोत्तरावयव-द्रवत्वानि संयुक्तसंयोगै: प्रतिबद्धानि—Praśastapâda, कर्म्म ग्रन्थ).

2. Upward Motion (आरोहण, *e.g.*, evaporation).

In evaporation, the fluid particles are rarefied, and remain in a fine state of suspension; the rarefaction is due to the impulse (नोदन) or impact (अभिघात) of the heat particles in the sun's rays, and the upward movement is due to their contact with the air under this impulse or impact. Sankara Misra notes that in boiling there is a similar upward movement of water particles under the impact of heat rays. (नाड्यो वायुसंयोगात् आरोहणं नोदनापीडनात् संयुक्तसंयोगात् च। Sutras 5 and 6, Ahnika 2, Chap 5, Vaisheshika Aphorism). (यथा स्थालीस्था आप: क्वथ्यमाना: वायुनुन्नवह्निरश्मय ऊर्द्ध्वम् नयन्ति –Sankara Misra, उपस्कार).

N.B.—These two Sutras of Kanâda have been interpreted by the late Gangâdhara Kaviratna in his commentary to refer to the upward conduction of water in pipes by the pressure of air.

The mention of the transmitted pressure (संयुक्तसंयोग) of the air seems to lend some countenance to *Gangadhara's view, and the word Naḍi* (नाड्य) *offers no difficutly, being taken* in its usual sense pipe (नालिका, Nalikâ) while the current interpretation does violence to the common acceptation of the word.

3. Capillary Motion (अभिसर्पण)

Two instances are given,—the ascent of the sap in plants from the root to the stem, (अभित: सर्पणं मूले निषिक्तानामपां वृक्षे —Sankara *Misra)* and the penetrative diffusion of liquids in porous vessels, *e.g.*, of the oil or ghee in an earthen jar (कुम्भादौ अन्तर्निहितानां तैलघृतादीनां स्यन्दनं अपनञ्च). Heat particles have a like penetrative power (दृष्टश्चानिरोधो भर्ज्जनकपालादौ तेजस: पच्यमानद्रव्य पाकसिद्धे: कलशे च निषिक्तानां अपां शीतस्पर्शग्रहणादनिरोध: —Jayanta, न्यायमञ्जरी, Ahnika 8, इन्द्रियाणां प्राप्यकारित्वम्)

This is ascribed to *adriṣta*, as the cause cannot be ascertained by either perception or inference (including hypothesis) (प्रत्यक्षानुमानाभ्यां अनुपलभ्यमानकारणम् –Sridhara.)

SECTION 5.

INTERESTING EXAMPLES OF MOTION ASCRIBED TO ADRIṢTA (UNKNOWN CAUSE, UNEXPLAINED NATURE, FINAL CAUSE.)

The first motions in primordial atoms at the beginning of Creation are attributed to *Adriṣta.* Among movements in masses of matter so caused are noted the motion of the globe of the earth and similar other bodies (महाभूतानां भूगोलकादीनां प्रकम्पनं चलनम् Praśastapâda with Sridhara's commentary, कम्पेग्रन्थ). Most probably this means earthquakes, tides, etc. Aryabhata and his school would no doubt bring under this head the diurnal motion of the earth. It is interesting to note in this connection that Bhâskara refutes the Buddhist hyphothesis of the earth falling perpetually *in vacuo*, by arguing that the earth must remain balanced in space, as there is nothing outside to attract it.

The movement of the needle (iron in general, as Sankara Misra notes) towards the magnet is another example of unexplained motion in matter. Cleaning and right placing of the magnet (संमार्ज्जनम्, ऋजुस्थापनम्) are necessary सूचीनां लौहशलाकानां, अयस्कान्ताभिमुखगमनम्, सूच्यादयुपलक्षणम् अयस्कान्ताकृष्टलौहमात्रमभिप्रेतम्—Sankara Misra.

Similarly amber attracts grass (straw, etc.)

(तृणकान्तमण्याकृष्टानां तृणानां गमने Sankara Misra, on Sutra 15, Ahnika 1, Chap V.)

Involuntary movements of the hand under the influence of the hypnotist's *mantras* (incantations) are also attributed to *adrişta*.

SECTION 6.

MEASUREMENT OF MOTION. UNITS OF SPACE AND TIME.

The solar day was taken as a natural measure or division of time. In the Nyâya-Vaiśeşika School, the day of 24 hours (solar) is stated to contain 30×30×30×18×2×2 units of time (kşaņas). The Nyâya unit of time therefore measures 2/45ths of a second. The smallest measure of time mentioned by the astronomers is the Truti which is =1/33750th of a second.

The natural measure of length was the cubit (Hasta), of which there were two fixed standards (the greater and the lesser cubit). The smallest measure of length mentioned in the Silpa-sâstra (Technology) is the Paramâņu, which is about 1/349525th of an inch. This is the same as the Trasareņu of the Nyâya-Vaiśeşika School, which stands for the thickness of the minimum visible (the finest mote perceptible in the sunbeam, as it comes slanting into a dark room through a chink).

Average velocity (स्थूलगति—Bhâskara) was measured in accordance with the formula

but no unit of velocity appears to have been fixed upon. There was no idea of acceleration, and of course no measurement of force. Where the velocity is uniform, the interval of time may be of any amount (स्थूलकाल), but where the velocity is variable, (प्रतिक्षणसमागतिः—Bhaskara), an indefinitely small quantity of time (सूक्ष्मकाल) must be taken; in other words, the positions of the particle in two successive *instants* must be considered, and the velocity must be supposed to be uniform during this interval (conceived as indefinitely small, सूक्ष्म) It was in this way that Bhâskara determined the instantaneous motion of a planet (तत्कालिकी गति)

Component of velocity.

The astronomers measured the motion of a heavenly body in different directions (longitude, right ascension, etc.), and calculated separately the components of motion (गतिकलाः) in these directions.

And they adopted the device of transferring such component velocities from one body to another in the computation of relative motion (*e.g.*, एवं सति आचार्येण लाघवार्थं इष्टघटीसम्बन्धिन्यो गतिकला अर्के प्रक्षिप्ताः Bhâskara, Siddhânta-Siromoņi, Gaņitâdhyâya, Ghatisphuti-prakaraņa).

SECTION 7.

NOTION OF THREE AXES.

Motion, we have seen, was defined as the change of position of a particle in space. To conceive position in space, Vâchaspati takes three axes, and the position in space of one particle relatively to another may be indicated by distances measured along these three axes (*vide* my paper on The Mechanical, Physical and Chemical Theories of the Hindus, in Dr. P. C. Ray's Hindu Chemistry, Vol. II, pp. 211-212). This remarkable analysis (circa 842 A.D.) वस्वङ्कवसुवत्सर Vâchaspati, Nyâyasuchinibandha) anticipates in a rudimentary manner the foundations of solid (co-ordinate) geometry, eight centuries before Descartes.

The principle of the differential calculus applied to the computation of motion (variable motion.)

Bhâskara (1150 A.D.) in computing what he calls the "instantaneous" motion (तात्कालिकी गति) of a planet compares its successive positions in two successive instants, and regards the motion as constant during the interval which he conceives to be indefinitely small (सूक्ष्मकाल). This is equivalent to the determination of the differential of the planet's longitude, and the process bears "a strong analogy" (to quote the words of Mr. Spottiswoode, the Astronomer Royal) "to the corresponding process in modern mathematical astronomy." I have elsewhere shown that Bhâskara's process was not merely analogous to, but virtually identical with, that of the Differential Calculus, Mr. Spottiswoode's cautious reservation having been due to his want of acquaintance with the original and the insufficiency of the materials placed before him. (*Vide* my paper on the Mechanical, Physical and Chemical Theories of the Hindus in Dr. P. C. Ray's Hindu Chemistry, Vol. II, pp. 158-163.)

SECTION 8.

RELATIVE MOTION.

The phenomenon is noticed among the hallucinations of sense) नाव्यारूढस्य गच्छत: पर्वतादीनि [illegible] भनेव भमतस्य तान् --Kumârila, Sloka Vartika, p. 520). Astronomers like Âryabhata and Lalla who believed in the diurnal revolution of the Earth from the West to the East explained the apparent revolution of the starry Heavens in the opposite direction by the principle of relative motion.

SECTION 9.

SERIAL MOTION.

Several Santânas (series) of motions are incidentally noticed, *e.g.*, vibration (स्पन्दन, कम्पसन्तान), wave-motion (वीचितरङ्ग), current motion (स्यन्दन).

In an interesting passage, Charaka notes three instances of serial motion, *viz.*, those of water, sound and light (जलसन्तान, शब्दसन्तान and अर्चि:सन्तान) to which he compares the course (सन्तान) of chyle (or chyle blood) in the Dhamanîs (veins) and other ducts of the body.

Dalvana thinks that downward, oblique and upward currents of chyle are respectively intended by the three illustrations ; but Chakrapâṇi points out that the Santâna (wave) of sound travels in all directions (the same is of course true also of light); and that differences in speed (and not in direction) are here meant. In other words, a Santâna of sound travels more rapidly than that of water and less rapidly than one of light (अर्चि:सन्तान), and Charaka's meaning is that the metabolic course may complete its circuit with greater or less speed. Whether, in this passage, the three Santânas are viewed as waves or currents is not specified. But the difference between a wave (वीचि) and a current (स्यन्दन) was well-known.

A current of water (स्पन्दन, downward flow) consists of particles moving in an uninterrupted series under the action of gravity and fluidity (गुरुत्व and द्रवत्व, Sankara Misra). A wave (वीचितरङ्ग), on the other hand, is constituted by the transmission of vibratory motion (स्पन्दन) in the water particles (*e.g.*, Jayanta, पतद्घनपयोबिन्दुसन्दोहस्पन्दनक्रमात् Nyâya-Manjari, Ahnika II).

A ray of light, on the other hand, was supposed to imply the rectilinear propagation of indefinitely minute corpuscles in all directions, with inconceivable velocity, and a sort of conical dispersion (अचिन्त्योहि वेगातिशयः तेजः प्रसर्पति पृथ्वग्रत्वात्-Udyotakâra, Vâchaspati).

APPENDIX E.

HINDU IDEAS ON ACOUSTICS.

SECTION 1.

ANALYSIS OF SOUND.

The Mimâmsakas :—In their analysis of Sound, the Mimânsakas distinguish between three elements : (1) Nâda a quality of Vâyu (air), which is the physical basis of audible sound, (2) Dhvani, sound as heard, audible sound, and (3)—in the case of significant sound,—Sphota, 'transcendental' or 'intelligible' sound, representing the Platonic ideas or *logoi*, which are eternal (नित्य), ubiquitous (व्यापक), and noumenal (निराधार, lit., without substrate or ground—Kumârila). The Sphotas are manifested by the Dhvanis (audible sounds), of course only in the case of words (शब्द, संज्ञा). Upavarṣa, the teacher of Panini, rejects the *sphotas* in favour of the *varnas*, which are conceived to be "phonetic moulds" with natural significance.

As regards sound in its physical aspect and the mode of its propagation, some of the Mimânsakas content themselves with saying that Vâyu (air) has a special quality (Nâda), which causes audible sound, (नादो वायुगुणः वायुर्वा यदि कल्प्येत— Kumârila, Sloka-Vârtika). (वायुरेव ताल्वादिस्थानसंयोगात् शब्दगुणको निष्पद्यते, शब्दस्यापि वायुगुणत्वं वेदितव्यम्—Pârtha-Sârathi Misra, Nyâyaratnâkara). Others, including the teachers of the Sikshâ (Vedic chanting), hold that the physical basis of sound is a series of air movements (वायुसन्तान, cf. Udyotakára's and Vâchaspati's *reports) ; in other words, the air particles themselves flow in a current in all directions, being obstructed in their path by the impact of tangible objects (i.e.*, material bodies), and the movement ceases, as in the arrow, when the moving force is thus exhausted (*e.g.*, स गच्छन्सर्वतोदिशु उद्दामवेगाहितक्रियः शरवत् वेगशान्त्येव न दूरं गन्तुमर्हति...शिक्षाविदस्तु पवनात्मकमेव शब्दमाचक्षते, Jayanta Nyâya-Manjari). But the orthodox Mimânsâ view is that of the Mimânsâ Doctor, Savara Svâmi, who holds that Nâda (the physical basis of sound) is a wave motion of air, being the transmission of conjunctions and disjunctions in the minute particles of air, the wave originating in the first impact, and being continued by the successive impacts of the minute particles (*e.g.* संयोगविभागानैरन्तर्येण क्रियमाणाः शब्दमभिव्यञ्जन्तो नादशब्दवाच्याः (17-1-1) अभिघातेन हि प्रेरिता वायवः स्तिमितानि वाय्वन्तराणि प्रतिबाधमानाः सर्वतो दिक्कान् संयोगविभागान् उत्पादयन्ति यावद्वेगं अभिप्रतिष्ठन्ते ।'ते च वायोरप्रत्यक्षत्वात् संयोगविभागा नोपलभ्यन्ते । अनुपरतेषु एव तेषु शब्द उपलभ्यते । नोपरतेषु अतएव च अनुवातं दूरात् उपलभ्यते शब्दः— Savara Bhâshya, Sutra 13, Pada 1, Adhyâya I). In this view, the particles of air (वाय्ववयवाः) are subject to a vibratory motion (a sort of *parispanda*) in the production of sound (परिस्पन्द विलक्षण—Jayanta, Nyâya-Manjari). The Vâkyapadiya describes articulate sounds (*varnas*) and indeed all sounds (*sabdas*) as only forms of air set in motion, with rarefaction and condensation (प्रचय), and capable of variations of velocity and configuration (लब्धक्रिय: प्रयत्नेन वक्तुरिच्छामनुवर्त्तिना स्थाने ष्वभिहतो वायु: शब्दत्वं प्रतिपद्यते । तस्य कारणसामर्थ्यात् वेगप्रचयधर्म्मिण: संनिपातात् विभज्यन्ते सारवत्योऽपि मूर्त्तय: । Vâkya-padiya, Kânda 1, Sloka 109).

Nyâya-Vaiśeṣika :—The early Nyâya writers hold that the sound-wave (शब्दसन्तान) has its substrate in Akâsa (ether) and not Vâyu (air). Later writers (*e.g.*, Vâchaspati in the Tattvavindu) add that sound itself as a phenomenon is not to be conceived as a mode of motion (*parispanda*), for Akâsa, the substrate, is, in the Nyâya view, incapable of motion. (न तावत् परिस्पन्दस्तस्य मूर्त्यनुविधायिनो द्रव्ये विभुनि विभुगुणे वा शब्दे मूर्त्यभावेना संभवात्—Tattvavindu). At the same time, the propagation of sound must be conceived on the analogy of waves in water (वीचितरङ्गन्याय). Udyotakâra in the Vârtika, Váchaspati in the Tâtparyyatîkâ, and Jayanta in the Nyâya-Manjarî controvert the three views current in the Mimânsâ school,—(1) that Nâda, the physical basis of audible sound, is a specific quality of Vâyu (air), (2) that sound in its physical aspect, is constituted by a series of air movements of the nature of a current (वायुसन्तान), and (3) that it is not air currents but air waves, series of conjunctions and disjunctions of the air particles or molecules (वाय्ववयवा:, वायुपरमाणव:), that constitute the Nâda, the sound physical, to which, in the case of significant sounds, the Mimânsakas assign the function of manifesting the *sphota*, 'transcendental' or 'intelligible' sound (logos, the word)—(*Vide* Udyotakâra Vârtika, Adhyâya 2, Ahnika 2, Sutra 14). Also Tâtparyyatîka, माभूत् वायुसन्तानो मा च भूततद्गुणो नाद: शब्दस्य व्यञ्जक: वायवीयास्तु संयोगविभागव्यञ्जका भवन्ति इत्यतआह etc., loc. cit. Against these views, the early Nyâya Doctors maintain that sound is a specific quality of Akâsa (ether) and not of Vâyu (air). At the same time, they admit that the impact which originates the sound phenomenon (अव्याप्यवृत्ति अयावद्द्रव्यभावि विशेषगुण) in Akâsa does so by setting up a vibration in the molecules of the object struck (*e.g.*, a bell), and that these vibrating molecules impinge against the air molecules in contact (वायुपरमाणव:, आध्यात्मिकवायु:). In other words, though Akâsa is the substrate (आश्रय), the efficient cause of sound (निमित्तकारण) is to be found in the mechanical impact (अभिघात) of vibrating molecules of sonorous bodies against contiguous molecules of air. As to the propagation of sound, the early Nyâya-Vaiśeṣika writers content themselves with stating that the first sound thus produced in the substrate Akâsa by the impact of the vibrating molecules (*e.g.*, of a bell) against the contiguous molecules of air, produces a second sound in the contiguous Akâsa, and the second sound, a third, and so on, in the same way as waves are generated in water, until the last sound sets up a vibration in the ear-drum (कर्णशष्कुलि). Of course, this propagation of sound-wave in Akâsa (ether) is effected by means of the air-wave as its vehicle. This is the Nyâya-Vaiseshika hypothesis (कल्पना) of an independent sound-wave (शब्द-सन्तान). Akâsa (ether) is motionless, but the air wave would not be transmitted, if the air molecules were not inter-connected by Akâsa. Praśastapâda, the Vaiseshika Doctor, for example, describes the first sound as giving off a second, the second a third, and so on, expanding in Akâsa, in the same way as waves are supposed to propagate themselves in the ocean शब्दोऽम्बरगुण: संयोगविभागशब्दज:................................ स्थानवायुसंयोगापेक्षमाणात् स्थानाकाशसंयोगात् वर्णोत्पत्ति: । अवर्णलक्षणोऽपि भेरीदण्डसंयोगापेक्षा । भेर्य्याकाशसंयोगात् उत्पद्यते । वेणुपर्वविभागात् वेण्वाकाशविभागाच्च शब्दाच्च शब्दाच्च संयोगविभागनिष्पन्नात् वीचिसन्तानवत् शब्दसन्तान इत्येकं सन्तानेन श्रोत्रप्रदेशमागतस्य ग्रहणम् । Praśastapâda. यथा जलवीच्या तदव्यवहिते देशे वीच्यन्तरमुपजायते ततोऽप्यन्यत् ततोऽप्यन्यदित्यनेन क्रमेण वीचिसन्तानो भवति तथा क्रमेण शब्दसन्तानो भवति । नन्वेषा कल्पना कुत: सिद्धेत्यताह etc., Sridhara, *ibid*). On this hypothesis, the locus of the sound at any moment forms a circle in Akâsa, and the propagation is carried on, in the air, by means of ever-expanding circles, as in the case of waves in water. But this analogy is rejected by some (*e.g.*, Udyotkâra), who hold that the first sound gives off, not one sound in a circle, but an indefinite number of sounds in all directions, and each of these again gives off another, and so on, so that sound may be said to expand by successive concentric spherical layers, even as the Kadambakoraka (the so-called bud of the *nauclea kadamba*) expands by successive concentric spherical layers of filaments which shoot forth from one another. On the first of these two hypotheses, the air-wave implied in the transmission of sound is of the nature of what we call transverse waves ; - on the second, of the nature apparently of longitudinal waves. In any case, it is clear that the orthodox Mimânsa view of Śavara Svâmi that the air-wave constituting physical sound means a series of mere conjunctions and disjunctions of air particles with rarefaction and condensation, सर्वतोदिक्कान्–संयोगविभागानैरन्तर्य्येण, (Śavara, प्रचय, Vâkyapadiya) implies longitudinal waves वीचितरङ्गन्यायेन तदुत्पत्तिस्तु कीर्त्तिता कदम्बकोरक न्यायादुत्पत्तिः कस्यचिन्मते Visvanâtha, Bhâshâ Parichheda, Sloka 165. परिशेषात्तु सन्तानसिद्धिः। तत्राद्यः शब्दः संयोग-विभाग-हेतुकः। तस्मात् शब्दान्तराणि कदम्बगोलकन्यायेन सर्वदिक्कानि । तेभ्यः प्रत्येकमेकैकः शब्दः मन्दतरतमादिभावेनाश्रयाप्रतिबन्धमनुविधीयमानः प्रादुरस्ति । ततोऽन्त्यस्यातिमान्द्यात् शब्दान्तरोत्पत्ति-शक्तिविघातो येन केनचित् प्रतिबन्धात् भवति (Udyotakâra, II, 2, 14). As the momentum of the impact series (which constitutes the efficient cause of the sound-wave) grows feebler and feebler in the course of transmission through the air particles, the sound at last dies away. Gangeśa in the Chintâmani holds that the propagation is not from molecule to molecule, but travels in ever-expanding circles as in water-waves, perhaps in spherical layers by compression of masses of air ; and these air-waves, the vehicles of sound, are exceedingly swift. This explains the velocity of sound. (शब्देन च अव्यवहितपरमाणु-देशोत्पादक्रमेण न शब्दारम्भो येन मेघजादिशब्दानां भूलोक प्राप्तिर्युगान्तरेऽपि न स्यात् । किन्तु मेघाद्यभिहतं सर्वतोगामि-महावायोर्महति देशे संयोग-निमित्तमासाद्य आद्यशब्देन सर्वे दिग्वन्तशब्दः एक एव जन्यते उत्तरोत्तरेणापि अधिकाधिकदेशतः सर्वत एकैक एव शब्दः वीचितरङ्गवदुपपद्यते वायोश्च नयनवत् महावेगतया शीघ्रगामित्वेन अग्रिमशब्दारम्भात् आद्यशब्दानन्तरं अचिरेणैव शब्दोपलम्भः । वायोरेव च मन्दतरतमादिक्रमेण मन्दादिशब्दोत्पत्तिः यथा आद्य शब्देन कदम्बगोलकवद् दशदिशि दशशब्दा आरभ्यन्ते तैश्च दशशब्द सन्ताना इति (Gangeśa, Tattva Chintâmani).

But how does the first sound produce the second, the second the third, and so on ? At every step, the efficient cause, the impact of some vibrating molecule against a contiguous molecule of air, must be posited, and this is equally applicable to a sound produced by a sound, (शब्दजशब्द) as to one produced by conjunction and disconjunction (संयोगज or विभागज). In other words, the sound-wave (शब्दसन्तान) in Akâsa necessarily implies an air-wave The Mimânsaka view, then, that explains the propagation of sound by the transmission of the original oscillatory motion through the successive layers of air by means of successive impacts or pressures producing conjunction and disjunction of air molecules (वायवीयाः संयोगविभागाः—Śavarabhâshya), or rarefaction and condensation (प्रचय—Vâkyapadiya), is also implied in the Nyâya-Vaiseshika doctrine of the sound-wave (शब्दसन्तान), the difference being that in the latter the air-wave, which is conceived as a mode of serial motion (गति-सन्तान) is only the vehicle or medium of propagation of a so-called sound-wave in Akâsa which is not itself a mode of motion. This is what we find expressly and elaborately formulated in the later Nyâya-vaiseshika (*vide* Gangeśa, Chintâmani, supra).

SECTION 2.

ANALYSIS OF VIBRATORY MOTION, E.G., OF A BELL (IN AIR).

The molecules of a bell vibrate when the bell is struck. The question is—what the nature of this vibratory movement ? Vâtsyâyana and Udyotakâra answer that when the hand strikes the bell, some of the molecules are displaced (from their stable position,—*i.e.*, there is *karma* in the molecules), and thus a Sanskâra (here a kinetic Sanskâra, momentum) is generated (संस्कार, कम्पसन्तानसंस्कार, Vâtsyâyana and Vâchaspati), and the molecules swing forward under the action of this Sanskâra, until they strike the contiguous molecules of air. This now is a case of mutual impact which divides the momentum between the colliding masses, and the bell-molecules begin to swing backward, the motion continuing under the action of the diminished Sanskâra, until they come in collision, again, with other air-molecules; and then the process is repeated, and the bell-molecules begin to swing forward and backward, until the original energy which is parted with in some measure at each impact becomes so feeble as to be unable to produce any kinetic disturbance (कर्म्म). Similarly, the air-molecules themselves are set vibrating by means of these impacts, and the transmission of the motion would form the wave of air, which the later Nyâya-Vaiseshika expressly posit as the vehicle of the sound-wave. But Udyotakâra never conceived vibration *in vacuo*, nor does it appear if he meant to include the second species of Sanskâra (elasticity, sthitisthâpaka sanskâra) as converted from its potential state (अतीन्द्रियत) into kinetic energy, and thus contributing to the momentum (*vega*). He uses the generic term Sanskâra, which comprehends elasticity as well as momentum due to impressed force. His commentator Vâchaspati does not go into details, and does not analyse the momentum. Later writers, however, expressly state that elasticity (sthitisthâpaka sanskâra) is one of the causes of vibration, and that elasticity resides not only in the element of earth, but also in air, water and *tejas* (cf. Visvanâtha).

घण्टायामभिहन्यमानायां तारस्तारतरो मन्दो मन्दतर इति श्रुतिभेदान्नानाशब्दसन्तानोहि अविच्छेदेन श्रूयते Vâtsyâyana, II, 2, 36 पाणिसंश्लेषमपेक्षमाणात् कर्म्मणः पाणि-घण्टासंश्लेषात् पाणिगतवेगापेक्षात् घण्टायां कर्म्म तत्कर्म्म पाण्यभिघात-मपेक्षमाणं विभागसमकालं संस्कारं करोति । सा चजन्याध्यात्मिकं वायुमुपगृह्णाति सा च वायुनाभिता पुनः कर्म्म करोति । ततः कर्म्मणः संस्कारः संस्कारेण पुनः कर्म्म पुनर्वायूपग्रह इत्येवमादिन्यायेन संस्कार उत्पद्यते । तत्र अन्त्यस्यातिमान्द्यात्घण्टायां महाभूतक्षोभशक्तेरभावः ततो वायूपग्रहोच्छेदः ततःसंस्कारक्षय इति (1) Udyotakâra Vârtika, Adhyâya 2, Ahnika 2, Sutra 36. (घण्टातद्द्रव्यत्रसंयुक्ता वायुपरमाणव एव आध्यात्मिको वायुः Vâchaspati Tâtparyyatika, loc. cit. also संस्कारं वेगाख्यं करोति)—But cf. Visvanâtha संस्कारभेदो वेगोऽथ स्थितिस्थापकभावने । मूर्तमात्रे तु वेगः स्यात् कर्म्मजो वेगजः क्वचित् । स्थितिस्थापकसंस्कारः क्षितौ केचिच्चतुर्ष्वपि । अतीन्द्रियोऽसौ विज्ञेयः क्वचित् स्पन्देऽपि कारणम् Bhâshâ-paricchoda, Slokas 157-159.

As the air-wave forms the vehicle of the sound-wave, if it does not constitute the sound-wave itself, the favourable or retarding influence of currents of wind is easily explained. The presence or absence of water (and other intervening objects) offering greater or less resistance to the transmission of the wave-motion also easily accounts for the greater or less distance to which the sound is carried.

SECTION 3.

ECHO.

प्रतिध्वनि—Echo was supposed to be a reflection of sound. Some consider it to be an after-sound, a sound generated by sound. Others suppose it to be due to the reflection of sound in the same way as an image in water or in a mirror (प्रतिबिम्ब) is due to the reflection of light. There is an element of hallucination in either case (बुद्धिपरिणामविशेषः)—the image in water is not a real image, neither is the echo the real sound it is taken to be (रूपवत्त्वं च न सामान्यतः प्रतिबिम्बप्रयोजकं शब्दस्यापि प्रतिध्वनिरूपप्रतिबिम्बदर्शनात् । न च शब्दजन्यं शब्दान्तरमेव प्रतिध्वनिरिति वाच्यं स्फटिकलौहित्यादेरपि जपासन्निकर्षजन्यतापत्त्या प्रतिबिम्बमिथ्यात्वसिद्धान्तक्षतेरिति । प्रतिबिम्बश्च बुद्धेरेव परिणामविशेषो बिम्बाकारो जलादिगत इति मन्तव्यम् । Vijnânabhikṣu, Pravachana-Bhâṣya, Chap. I, Sutra 87.)

SECTION 4.

PITCH, INTENSITY AND TIMBRE.

Sounds differ from one another by their pitch (तारमन्द्रादिभेद), by their intensity (तीव्रमन्दादिभेद), and by their quality or timbre (असाधारण धर्म्म.) When a bell is struck, an indefinite number of notes (श्रुतिभेद, tones and overtones) are emitted, of varying pitches; and the notes die away, becoming less and less intense. Now we know that the molecules swing to and fro, and that the Sanskâra (momentum, vega) of the vibrations (कम्पसन्तानसंस्कार) grows feebler and feebler. The differences in pitch (tones and overtones) as well as in intensity must be due to variations in the Sanskâras of the vibrations. The distinguishable pitches (called Srutis, श्रुतिभेद) as well as the degrees of intensity (तीव्रमन्दादि) must be ascribed to variations in the *vega* (momentum), and, by implication, the frequency, etc., of the vibrations.

Cf. Vâtsyâyana, II, 2, 36— घण्टास्थं सन्तानवृत्तिसंस्कारभूतं पटुमन्दमिति वर्त्तते तस्यानुवृत्त्या शब्दसन्तानानुवृत्तिः पटुमन्दभावाच्च तीव्रमन्दता शब्दस्य तत्कृतश्च श्रुतिभेदः *Vide* also Udyotakâra's analysis of vibration based on Vâtsyâyana— घण्टायामभिहन्यमानायां तारस्तारतरो मन्दोमन्दतर इति श्रुतिभेदान्नानाशब्दसन्तानो हि अविच्छेदेन श्रूयते । सन्तानवृत्तित्वात् मन्दतरमन्दतमादिभिन्नरूपानुविधायिनं शब्दमुत्पादयन्ति तत्र कारणं संस्कारः—Udyotakâra, Vârtika, Adhyâya 2, Ahnika 2, Sutra 36 - सन्तानवृत्तिना कारणेन श्रुतिभेदोत्पत्तिः Vâchaspati, Tâtparyyatikâ, loc. cit.)

Sounds also differ from one another in volume or massiveness in the case of coalescence (समानजातीयोपचय). A sound both loud and massive is called महान् (large)—एवं शब्दसन्तान एव तारः महान् इत्युच्यते तत्राप्यस्ति समानजातीयोपचयः अस्ति च स्फुटतरत्वम् महानपि स्फुटतरः । अयमपि तथा इति महानित्युच्यते Vâchaspati, II, 2, 36.

Śavara, the Mimânsâ Doctor, explains massiveness (महत्त्व) as due to नादवृद्धि the coalescence of different air-waves, which by their simultaneous impact affect a comparatively large tract of the ear-drum (यश्चैतत् बहुभिर्भेरीमाध्मानद्भिः शब्दमुच्चारयद्भिर्महान् शब्द उपलभ्यते । न वर्द्धते शब्दः । मृदुरेकेन बहुभिरप्युच्चार्य्यमाणे तान्येव अक्षराणि कर्णशष्कुलीमण्डलस्य सर्वां नेमिं व्याप्नुवद्भिः संयोगविभागनैरन्तर्य्येण अनेकशो ग्रहणात् महान् इव अवयववानिव उपलभ्यते । संयोग विभागानैरन्तर्य्येण क्रियमाणाः शब्दमभिव्यञ्जन्तो नादशब्दवाच्याः । तेन नादस्यैषा वृद्धिः न शब्दस्य—Śavara on Jaimini, Sutra 17, Adhyâya 1, Pâda 1). The Mimánsakas who resolve sounds into air waves attribute all differences, whether of pitch, intensity, or massiveness, to differences in the series of conjunctions and disjunctions of air particles that form the waves (*Vide* Vâchaspati's report शब्दानां तु संयोगविभागयोनीनां युक्तस्तद्भेदेन रूपभेदः) Cf. also the later Nyâya-Vaiseshika which accepts air-waves as vehicles of sound-waves :—वायोरेव मन्दतरतमादिक्रमेण मन्दादिशब्दोत्पत्तिः (Gangeśa, Tattva Chintâmani). It may be noted that the terms तीव्र and मन्द are occasionally used in a general sense, and applied to express higher and lower degrees of pitch as well as of intensity.

There are also differences of quality (शब्दस्य असाधारणधर्म्मः) The same sound *ga* (ग), of the same pitch and intensity, uttered by men, and parrots, can be distinguished—so also the sounds, even the same notes of the scale, given out by a wind instrument like the *venu*, and a stringed instrument like the *vina*. Similarly, there are sexual and even individual differences of voice (अस्ति हि शुकसारिकामनुष्यवक्त्रप्रभवेषु कारादिषु स्फुटतरः रूपभेदप्रत्ययः पुंसाम् । एवं स्त्रीपुंसप्रभवेषु स्त्रीपुंसभेदप्रभवेषु च— Vâchaspati, Tâtparyyatikâ, II, 2, 14,—वीणा वाद्यते वेणुः पूर्य्यते वीणावेणुशब्दयोरसाधारणो धर्म्मः—Udyotakâra, II, 1, 15—वेणुवीणामृदङ्गादिप्रभवेषु भेदप्रत्ययः शुकसारिकामनुष्यकण्ठोत्थादिभेदप्रत्ययः—Gangeśa and Mathurânâtha). The sounds emitted by impact of the different Bhutas (echo from Akâsa, hissing from the wind, puffing from fire, bubbling from water, and *splitting or cracking from earth) are characteristic examples of such differences of timbre (Vide Panchadaśi, Bhutaviveka, Sloka 3).*

The Vâkya padiya (*Kânda I, Sloka 109*), as we have seen, ascribes all differences (whether of pitch, volume or timbre) to the characteristic forms of the air waves, which differ from one another by their configuration (सन्निपातात् विभजयन्ते मूर्त्तय:), and are capable of variations of velocity (momentum, vega) as well as of rarefaction and condensation (कारणसामर्थ्यात्) प्रचयधर्म्मिण:

There are passing references to the obscuration (अभिभव) of sounds in Vâtsâyana, Udyotakâra and Vâchaspati, but the subject is treated more from a psychological than from a physical point of view (तीव्रभेरीशब्द: मन्द तन्त्री-शब्दमभिभवति न मन्द: । नानाभूतेषु शब्दसन्तानेषु सत्सु श्रोत्र-प्रत्यासत्तिभावेन कस्यचित् शब्दस्य तीव्रेण मन्दस्य अभिभवो युक्त: (Vâtsâyana, II, 2, 14, *vide* Udyotakâra and Vâchaspati, loc. cit. Here तीव्र = loud, and मन्द = low.)

SECTION 5.

MUSICAL SOUNDS.

Srutis and Svaras :—We have already seen that the distinguishable pitches are called Srutis, and they are proportioned to the vega (momentum) of the kampa-santana (vibration). Now the ratio of a note to its octave (in respect of pitch) is given as 1 : 2,—we may therefore conclude that the *vega* of the vibration in the latter case was considered to be twice as great as in the former. An indefinite number of Srutis could be interposed between a note and its octave (आनन्त्यं हि श्रुतीनां च सूचयन्ति विपश्चित: यथा ध्वनि विशेषाणामनानं गगनोदरे । संगीतरत्नाकर । cf. संगीतपारिजात । केशाग्रव्यवधानेन वह्व्योऽपि श्रुतय: स्मृता:—संगीतपारिजात, Sloka 40), Twenty-two such are named and recognised for musical purposes. But a Sruti as such cannot constitute a musical tone (svara). A sruti is a simple (unmixed) and fundamental tone of a certain pitch, whereas an ordinary musical tone (svara) is really composed of a fundamental tone (sruti) and certain partial tones, (harmonics, Anurananas, (अनुरणन) The musical tones (svaras), vocal or instrumental, are therefore of the nature of what we call clangs, because, either accompanying or following the Srutis or simple fundamental tones (हृस्वादिमात्र) are always found certain partial tones (अनुरणन) व्यवहारे त्वसौ त्रेधा हृदि मन्द्रोऽभिधीयते । कण्ठमध्यो मूर्ध्नि तारो द्विगुणश्चोत्तरोत्तर: (संगीतरत्नाकर) हृदिमन्द्रोगलेमध्यो मूर्ध्नितार इति क्रमात् । द्विगुणं: पूर्वपूर्वस्मात्—Dâmodara, Sangitadarpaṇa, Chap. I, Sloka 49. श्रुत्यनन्तरभावी य: स्निग्धोऽनुरणनात्मक: । स स्वर: उच्यते—Sangita-ratnâkara —स स्वरोय: श्रुतिस्थाने स्वनन् हृदयरञ्जक: (संगीतदामोदर) द्वाविंशतिविधो मन्द्रोध्वनि: सञ्जायते हृदि । स एव द्विगुणो मध्य: कण्ठस्थाने यथाक्रमम् । स एव मस्तके तार:स्यान्मध्यात् द्विगुणक्रमात्—Sangita Samaya Sâra, 1, नादाश्च श्रुतयो जातास्तत: षड्जादय: स्वरा: । प्रथम श्रवणाच्छब्द: श्रूयते हृस्वमात्रक: सा श्रुति: सम्परिज्ञेया स्वरावयव लक्षणा: । स्वरूपमात्रश्रवणान्नादोऽनुरणनं विना । श्रुतिरित्युच्यते Dâmodara, Sangitadarpaṇa, Chap. I, Sloka 51. The relation between a Sruti and a Svara is variously conceived as (1) परिणाम model change ; (2) व्यञ्जन manifestation ; (3) तादात्म्यम् जातिव्यक्त्योरिव the relation of genus and species ; (4) विवर्त्तन (मुखं यद्वद् दर्पणेषु विवर्त्तितं) reflection; (5) कार्य्यकारणभाव, the relation of cause and effect ; Cf. संगीत पारिजात by Ahobala, श्रुतयस्तु स्वरा भिन्ना: श्रावणत्वेन हेतुना । अहिकुण्डलवत् तत्र भेदोक्ति: शास्त्रसम्मता । संगीतपारिजात Sloka 38.

SECTION 6.

THE NOTES OF THE DIATONIC SCALE : DETERMINATION OF THEIR RELATIVE PITCH.

The pitch of a note is inversely proportional to the length of the wire (तन्त्री तन्तुस्वरो घोष: तद्दैर्घ्यव्यस्तमानत:) (शेषलीलावती quoted by Mr. Devala in his 'Hindu Musical Scale').

The pitch of the fundamental note to that of its octave is as 1 : 2 (मध्यस्थानस्थ: षड्ज: द्विगुण सम :—रागविबोध quoted by Mr. Devala).

The pitch of the fourth note (F) to that of the fundamental (C) is as 4 : 3 (उभयो: षड्जयोर्मध्ये मध्यमं स्वरमाचरेत्-संगीतपारिजात quoted by Mr. Devala).

The virbrations of the fifth note (G) to those of the fundamental (C) are as 3 : 2 (त्रिभागात्मकवीणायां पञ्चम: स्यात्तदग्रिमे । (संगीतपारिजात quoted by Mr. Devala).

Concord (सम्वादित्व) is either perfect or imperfect. The ratio of perfect concord is 3 : 2—that of imperfect concord, 4 : 3—स-प-स-म मुख्या: संवादिन: स्वरा: एकसंश्रया: प्राय: (रागविबोध quoted by Mr. Devala) *e.g.*, if D be the Vâdi, A would be a Samvâdi, if E be the Vâdi, B would be a Samvâdi, in each case a perfect concord. The pitch of D is determined from that of G, and the pitch of A from that of D, in each case by the rule of perfect concord.

Determination of the pitches of E and B :—(after Mr. Devala). This may be done in either of the following ways :—

(1) E may be determined from A, and B from E by the rule of perfect concord. This would give $303\frac{3}{4}$ as the value of the pitch of E, and $455\frac{5}{8}$ as that of the pitch of B, if the pitch of C be taken as 240 ; *or*

(2) E may be determined from C by reduction of the fifth harmonic by two octaves, a sort of imperfect concord ; and then B may be determined from E by the rule of perfect concord. This would give 300 for E, and 450 for B, if C be taken as 240.

Mr. Devala in his investigations with the "Sonochord" finds that Hindu musicians (and Sanskrit writers on music) adopted the latter values for E and B, as they tested their notes by harmonics (वेदगतस्वयम्भूस्वरप्रं त्रिप्रामाण्येन—रागविबोध quoted by Mr. Devala). The Hindus therefore followed just intonation.

SECTION 7.

MUSICAL INTERVALS.

Musical tones are related to one another in four ways as Vâdis, Samvâdis, Vivâdis and Anuvâdis. The mediæval compilations explain these in reference to melody, and harmony is altogether unknown, but the terms might be used to indicate relations of harmony as well. The Vâdi might in that case answer to the key-note (or tonic) ; and the Samvâdis to the two consonances, the fifth (2 : 3), and the fourth (3 : 4).

The rule given for the determination of a Samvâdi is 12 or 8 Srutis intervening, the intervals being therefore 13 and 9 Srutis respectively (giving the ratios $\frac{3}{2}$ and $_3$).

C being the Vâdi, G and F are stated to be the Samvâdis. The first would answer to the dominant, and the second to the sub-dominant.

In the same way, it is stated that if D be the Vâdi, A would be a Samvâdi. If E be the Vâdi, B is given as a Samvâdi.

On the other hand, a two-Sruti interval (*i.e.*, a difference of a semi-tone) gives a Vivâdi, which would thus answer to a dissonance. This is given as a general rule (द्विश्रुत्यन्तरौस्वरौविवादिनौ mâtanga). Other cases are also noticed ; *e.g.* E is a Vivâdi to D, and B to A, and *vice versâ* (ratio of 9 : 10).

The notes that do not come under these heads are Anuvâdis (*e.g.*, the sixth), cf. Bharata, Nâtya-Sâstra, Chap. 28, Slokas 23-24.

Also Sangita-ratnâkara :—

चतुर्विधा स्वरा वादी सम्वादी विवाद्यपि अनुवादीति । वादीतु प्रयोगे बहुलस्वरः श्रुतयो द्वादशाष्टौ वा ययोरन्तरगोचराः मिथः सम्वादिनौ तौ स्तो निगावन्यविवादिनौ । रिधयोरेव वा स्यातां तौ तयोर्वांरिधापपि । शेषाणामनुवादित्वम् । (स्वराध्याय)

SUKRA-NITI

OR

SUKRÂCHÂRYYA'S SYSTEM OF MORALS.

N.B.—References are to lines and not to ślokas.

CHAPTER I.

THE DUTIES OF PRINCES.

[1] 1—3. Having saluted and duly worshipped the Stay of the Universe, the Cause of the origin, maintenance and destruction (of the Creation), Śukrâchâryya, the offspring of Bhṛigu, questioned with respectful decorum by Pûrvadevas or Asuras, his disciples, gave them a discourse on the essence of morals in the logical order.

[2] 4—5. For the good of men Brahmâ, the self-created Lord, had spoken that treatise on morals which contained 100 lakhs, *i.e.*, 10 million ślokas.

[3] 5—7. By a process of selection, the essence of that Nîti Śâstra, which was an extensive argumentative thesis, has been compiled in an abridged form by Vaśiṣṭha and others like myself for the increase of prosperity of rulers of the earth and of others whose life is of short span.

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[1] The book is described as having its origin in a lecture by a professor to his disciples.

पूर्व्वदेवैः—Bṛihaspati's disciples are the *devas*. **नीतिसारं**—Śukra delivers the **सार** *i.e.*, the essence or compendium, not the whole treatise. The other reading is **नीतिशास्त्रं** which makes Śukra, the author of the whole thing. But that is not to the point.

[2] The *end* of Nîti Śâstra, as conceived by its first propounder, is here mentioned as being **लोकहित** or usefulness to human beings. He believed that the precepts of Nîti would conduce to social well-being.

[3] Here is an indication that Śukra was only one of the many âchâryas who undertook the synoptical editions of the vast work of Brahmâ.

तर्कविस्तृतं—Extensive because of full logical discussion.

अल्पायुः—The abridgment was called for by the fact that art is long and life is short.

भूभृदाद्यर्थं—Princes are specially mentioned here as those to whom Nîti Śâstra was considered to be useful.

[1] *8-9. Other Śâstras treat of certain specialised departments of* human activity (and hence can be useful only in limited cases) whereas Nîti Śâstra is useful to all and in all cases and is the means for the preservation of human society.

[2] 10-11. As Nîti Śâstra is considered to be the spring of virtue, wealth, enjoyment and salvation, the ruler should ever carefully peruse it.

[3] 12-13. By knowing which, rulers can be victorious over foes, affectionate and conciliatory towards subjects and well up in the arts of statecraft.

[4] 14-17. Is not the knowledge of words and their meanings acquired without the study of *Grammar*? Cannot the knowledge of material substances be acquired without *logical* discussions? Cannot the rituals, practices

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[1] The scope and province of Nîti Śâstra are here distinguished from those of ordinary Śâstras. **क्रियैकदेशबोधीनि**—they have for their subject matter, *i.e.*, treat of **बोधि** one aspect **एकदेश** of human affairs. This refers to the principle of the division of labour among scientists and scholars and the necessary specialisation and differentiation of the sciences. Division of labour has both its advantages and disadvantages ; and so it is here mentioned that the utility of ordinary specialised sciences is limited, their horizon being narrow.

सर्वोपजीवकं—Nîti Śâstra is thus defined as a synthetic, comprehensive and generalised science (or rather art) of society, equivalent to Sociology in its wide sense, and hence should be considered equivalent to neither *Ethics* nor *a treatise on Polity*, but to *a system of morals, (social, economic and political)*. The scope of this science or art must be wide enough in order that it may offer practical advice as to social well-being. It is, in fact, a recognised principle in modern times that neither *Public finance*, nor *Economics*, nor *Political Science*, by itself, is competent to be a guide on the art of living.

[2] Nîti Śâstra is specially useful to princes for they hold in their hands the destiny of the peoples, and hence the learning that is calculated to promote human happiness has to be carefully mastered by them.

[3] Three uses of Nîti Śâstra are here mentioned and these indicate three aspects of social life, and hence three branches of the science. In the first place, this science or art can dictate policies about enemies, friends and neutrals, and advise international measures. In the second place, it can suggest the arts of winning over the hearts of the subjects and perform the work of psychology and ethics by studying human interests and motives as well as the ways of dealing with men. In the third place, it offers lessons on diplomacy and political activities in general by which one can be an able pilot of the ship of state.

[4] Uselessness and comparative insignificance of other sciences are here described. In praising the utility of Nîti Śâstra, the truths of which he is going to propound, the author disparages the four sciences mentioned as being of no practical service to mankind. For, a language can be learnt even by dispensing with its grammar and rules of Syntax ; Truth about a subject can be arrived at even without troubling oneself with syllogistic trains of reasoning. So also to understand the rites and ceremonies attending a religious worship one need not study the rules laid down by Jaimini, nor has one to master the subtle philosophy about the Supreme Being and the transcendental truths about the human soul in order to understand and feel the nothingness of the world and its affairs.

and ceremonies (*i.e.*, the practical part of religion or Karmakânda) be known without Mîmâṃsâ philosophy (*i.e.*, the *Pûrva Mîmâṃsâ* of Jaimini)? Cannot the frailty and destructibility of material body (and earthly possessions) be realised without the Vedânta philosophy (*i.e.*, the *Uttara Mîmâṃsâ* of Vyâsa, which treats of the eternal verities of the universe)?

[1] 18-19. These Sciences, moreover, treat only of the topics specially relegated to each (and give truths about them only); and hence are always cared for and mastered by such persons only as have need for those teachings (*i.e.*, whose life and occupation require a knowledge of those truths).

[2] 20-22. Are these sciences of any avail to persons following their ordinary affairs or avocations (vyâbahâris) in supplying them with skill and intelligence? But on the other hand without Nîti or the system of moral philosophy the stability of no man's affairs can be maintained. Just as without food the physical body of men cannot be maintained and preserved.

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[1] In ll. 14-17 the author has said that Grammar, Logic, Pûrva Mîmâṃsâ and Vedânta may well be dispensed with by men as they are of no practical utility and that the world would not be any the poorer if these Śâstras did not exist. A further ground of their disparagement is here mentioned (18-19). It is the fact that even if they have some sort of usefulness their usefulness is very limited, these sciences being adapted to special purposes, and not to the universal interests of man *as man*.

Thus there are men who need have no concern with languages or the correct methods of discussion, whose affairs in this world do not demand of them a knowledge of the Karma Kâṇda of the Vedas or of the highest truths of the universe. Such men would go on very well without the Sciences that deal with these topics, and are certainly not any the richer and happier for their existence.

[It is implied here that Nîti Śâstra is useful to all men and in all his concerns, and cannot in any way be neglected by man as a social animal; for man as man cannot do without those precepts which this Śâstra offers, whereas he can do many things and live in the world in many ways besides being a linguist or a logician, a priest or a philosopher, in which capacities only he need learn the Śâstras mentioned.]

स्व स्वाभिमत—its own special subject तत्तन्मतानुगैः—By such as, are अनुग *i. e.*, have to be follow the मत or teachings of each.

[2] The word व्यवहार has various meanings and is a technical term in jurisprudence. Here it denotes ordinary business, profession, occupation, &c.

These lines develop further the idea expressed above that man as an ordinary social and economic being cannot do without Nîti Śâstra, whereas he need not necessarily take the help of the other sciences. The universal occupations of man (सर्वलोकव्यवहार), the natural, fundamental and essential characteristics of human beings indispensably require for their स्थिति, *i.e.*, maintenance and order the precepts of Nîti Śâstra which is the most general and comprehensive human science.

Niti Śâstra is the very food of the social organism, its precepts supplying blood to, and helping to form the flesh of, the human society. Like food supplying the primal wants of physical life, it ministers to the fundamental interests of social existence,

[1] 23-24. Nîti Śâstra conduces to the desires and interests of all and hence is respected and followed by all. It is also indispensable to the prince since he is the lord of all men and things.

[2] 25-26. Just as in the case of the sick persons who take unprescribed food (अपथ्य) the diseases come immediately and do not delay in manifesting themselves, so also in the case of the princes who are unschooled in the principles of Nîti Śâstra, the enemies make their appearance at once and do not delay in declaring themselves.

27-28. The two primary functions of the king are protection of subjects and constant punishment of offenders; these two cannot be achieved without Nîti Śâstra.

29-30. The absence of Nîti Śâstra is always dangerous to a king like a vessel which leaks. It multiplies and satisfies enemies and causes the diminution of strength and efficiency.

[3] 31-32. The man who by severing obedience to Nîti becomes independent (and follows his own inclinations without reference to Nîti) has misery for his lot. Service to a lord in an independent way (*i.e.*, without following Nîti) is like licking the keen edge of the sword.

33-34. The king who follows Nîti is well-respected, but the king who does not follow it is not honoured. Where there are both Nîti and might there flourishes all-round prosperity.

[4] 35-36. In order that the whole State may be productive of good and comforts to the people without effort, Nîti must be maintained and followed by the king for his own interests.

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[1] Having discussed the comparative merits of the several sciences, the author is describing the universal utility of Nîti Śâstra and dilating on its special importance to the monarch. Morals have to be studied not only by the ordinary men of the world (व्यवहारि) for their common socio-economic interests but also and specially by the statesmen and politicians who are the guardians of the people. Nîti Śâstra is thus the science regulating social life, economic life and political life, in short, all the departments of human activity.

[2] Nîti Śâstra tutors kings to be always on their guard by keeping them well-informed of International Politics, and thus prevents the inroads of destroyers on the political organism.

[3] In ll. 29-30 the author has described the evil effects to a king of not following Nîti, *viz.*, that the state is jeopardised both externally and internally and totters to its fall. Here is described the evil effect to the subject of being स्वतन्त्र *i.e.*, independent (of Nîti), *viz.*, that he meets with misery and punishment.

[4] Peace and prosperity of the State can grow *as a matter of course* only if the relations between rulers and subjects, subjects and subjects, and foreign affairs are well administered according to the precepts of Nîti Śâstra; and these certainly promote the ruler's own interests आत्महित. It is his self-interest to advance social well-being and the happiness of the subjects and therefore to follow Nîti. अप्रेरित हित un-worked for (spontaneous), natural benefits, *i.e.*, advantages that come of themselves,

[1] 37-38. Of the prince who does not follow Nîti the kingdom is weakened, the army is inefficient, and the civil service is disorganised; other elements of the State get topsy-turvy, in short, evils prevail everywhere.

[2] 39-40. The king is the ruler, protector, and benefactor of the people and acquires his strength by penance. And he is the lord of this earth because of his deeds in the previous births as well as of penance.

[3] 41-42. Time is divided into several periods, epochs or ages according, in the first place, (to the atmospheric conditions, *e.g.*, moisture and temperature, *i.e.*,) to rains, cold and heat and (to the astronomical conditions, *e.g.*) to the movements, shape and nature of the planets; and in the second place, to the deeds and activities of men, whether beneficial or hurtful, and great or small.

[4] 43-44. The king is the cause of the setting on foot of the customs, usages and movements and hence is the cause or maker of time

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[1] There are सप्त अङ्ग or seven factors of the State:—(1) Sovereignty स्वामी (2) Ministers and officers अमात्य (3) Friends, सुहृत् (4) Treasure, कोष (5) Kingdom राष्ट्र (6) Fort दुर्ग (7) The Army बल. Each of these factors becomes weak and inefficient भिन्नं and there is the stamp of अकौशल्यं (*i.e.*, absence of good and prosperity) on the whole State when the ruler is not well up in Nîti. It is proficiency in Nîti that maintains each department in its proper place and contributes to the order and progress of the body politic. In these lines that aspect of Nîti Śâstra is implied which is equivalent to that branch of the art of politics by which the internal constitution of the State is regulated.

[2] तपसा तेज आदत्ते He gets the तेजः or powers (of ruling, protecting and doing good to the people) through his तपः. or penance. These two lines have no connexion with the importance of Nîti Śâstra to the king described above or with what follows about time and its effects.

[3] Measurements of time are here described as being twofold:—(1) Physical, according to (*a*) the seasons and (*b*) the rotations and revolutions in the Solar System which bring in days, nights, months and years. (2) Social or human, *i.e.*, historical, according to the events and movements in man's social life, *e.g.*, the age of Asoka, the epoch of the Reformation, &c.

आचारैः according to the practices, movements, customs, and usages, &c.—all those, in short, which mark what has been called 'the spirit of the age.'

[4] The author here discusses the question as to whether time is more important than man in regulating the affairs of the world. He takes for granted the doctrine that man is responsible for his धर्म्म and therefore must be a voluntary agent, regulating his own work by his own initiative and not at the will of other agents, *e.g.*, time. And, therefore, the common excuse that it is the spirit of the age, the कालधर्म्म that has done such and such things falls to the ground. It is rather advanced here that man is the maker of his age. The spirit of the age is what is created by the king's activities.

In describing the superiority of the king over time the author propounds a very important truth that man is the architect of his own fate. The line of arguments in *(i.e., the creator of epochs). If the age or time were the cause (of usages and activities) there could be no virtue in the actors.*

[1] 45-47. Through fear of the punishment meted out by the king, each man gets into the habit of following his own dharma or duty. The person who practises his own duty (and sticks to it) can become powerful and influential in this world. Without strict adherence to one's own walk in life there can be no happiness. Practising one's own duty is the paramount penance.

48-49. Even the gods minister to the wants of him by whom this practice of one's own duty is increased among men. What to say of the human beings?

[2] 50-51. The king should make the subjects acquire the habits of performing their duties by the use of his terrible sceptre. And he himself should practise his own religion, or his influence will be on the wane.

[3] 52-54. From the very moment a man attains the position of a king through skill, might or valour, no matter whether he is properly

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ll. 41-44 is as follows: The आचार makes the epochs of time, and the king makes the आचार, therefore, the king is the maker of काल or time.

From l. 43 it would appear that the author recognises the second of the above measurements of time, *i.e.*, Historical Division according to आचार as the primary standard of time and considers the Physical division to be within and subsidiary to it. Thus time should be reckoned not by centuries, years, months, days, &c., but calculated according to the epochmaking activities of kings. Historical movements are, in his opinion, the real basis of calculation with regard to time.

[1] The importance of the king and his authority is here brought out by the fact that it is his sceptre that keeps each individual subject to the performance of his own duty, and thus peoples the world with really able and happy inhabitants. For the strict observance of one's own avocations and the religious performance of one's own duties in life are the great promoters of human efficiency and happiness.

स्वधर्म One's own dharma or duty. These lines contain a praise of the celebrated doctrines of Personal Religion and Individual Morality (as opposed to those of Universal religion and Absolute morality) which form the bedrock of Hindu Sociology, and suggest the theory of अधिकारिभेद or Divisions of menaccording to their Fitness for the enjoyment of Rights on which the caste system is founded. This is the most fundamental maxim of Hindu social polity that every individual has his own religion and duty, and that religion and duty vary with the position, attainments and capabilities of individuals. This philosophy of the relativity of the duties of man to his position in society is eloquently taught by Śrî Kriṣṇa to Arjuna in the Gîtâ.

[2] The king's स्वधर्म or duty is to make the subjects स्वधर्म निरत *i.e.*, obedient to their own duties. If the king fails in his own duty, the subjects would go astray, each from his own work in life. And this would bring in misery and disorder upon the State. Hence the तेजः क्षय or diminution of influence and importance.

[3] The responsibility of the king to perform his स्वधर्म by enforcing the practice of स्वधर्म among his subjects and to protect them according to the rules of Nîti Śâstra begins from the very moment of his assumption of the royal position.

anointed and duly installed or not, he should begin to rule his subjects according to Nîti, being always above board and ever the holder of the sceptre.

[1] 55-56. Of the intelligent man even the small wealth can daily increase. And even lower animals can be subdued through heroism, morality, might and wealth.

[2] 57-58. There are three kinds of penance, *sâtvika*, *râjasika* and *tâmasa*. The king has his character according to the penance he often performs.

59-62. The king who is constant to his own duty and is the protector of his subjects, who performs all the sacrifices and conquers his enemies, and who is charitable, forbearing and valorous, has no attachment to the things of enjoyment and is dispassionate, is called *sâtvika* and attains salvation at death.

63. The king who has the opposite characteristics is *tâmasa* and gets hell at death.

64-8. The miserable king who is not compassionate and is mad through passions, who is envious and untruthful, who has vanity, cupidity and attachment for enjoyable things, who practises deceit and villany, who is not the same or uniform in thought, speech and action, who is fond of picking up quarrels and associates himself with the lower classes, who is independent of, and does not obey, Nîti, and who is of an intriguing disposition, is called *râjasa* and gets the condition of lower animals or immovable things after death.

69-70. The *sâtvika* king enjoys the blessings (?) of the gods, the *râjasika* those of the men, the *tâmasa* of the demons. Mind should hence be devoted to *satva*.

कुत्रया By artifice or by force or by heroism and not by the ordinary rule of succession. Śukrâchâryya is not a believer in the theory that 'necessity has no law' but maintains that in extraordinary cases also his Śâstra must be followed. Nîti Śâstra is unrelenting and extremely rigid in its precepts which cannot be relaxed or compromised even in revolutionary times, *e.g.*, when a throne falls vacant and is occupied by an usurper by hook or by crook. The usurper must not wait to have his claim formally recognised and his position well secured; but as soon as he gets the reins of government he must act upon the rules of Nîti like the legally recognised ruler of normal States.

As soon as a revolution is effected, the revolutionists must display their political ability by organising the administration and establishing security and order in the State. Śukranîti is here anticipating the sense of political morality manifested in modern times.

[1] Some of the virtues of a king and their effects. The two lines, however, have no connexion with the praise of **स्वधर्म** above or with what follows.

[2] There are three classes of kings according to their nature and characteristics.

71. Human birth ensues through the mixture of *satva* with *tamas*.

[1] 72. The men of the world have their luck and character according to the nature of the penance they adopt.

[2] 73-74. Man's work is the cause of his good or bad luck (prosperity or adversity). Even that which is called *prâktana* (*i.e.*, comes from previous birth) is really man's own work. Who can ever be without work?

[3] 75-76. Not by birth are the Brâhmaṇa, Kshatriya, Vaiśya, Śûdra, and Mlechchha separated, but by virtues and works.

[4] 77-78. Are all descended from Brahmâ to be called Brâhmaṇa? Neither through colour nor through ancestors can the spirit, worthy of a Brâhmaṇa, be generated.

79-80. The Brâhmaṇa is so called because of his virtues, *e. g.*, he is habitually a worshipper of the gods with knowledge, practices and prayers, and he is peaceful, restrained and kind.

81-82. The man who can protect men, who is valorous, restrained and powerful, and who is the punisher of the wicked is called Kshatriya.

83-84. Those who are experts in sales and purchases, who ever live by commerce, who are tenders of cattle and who cultivate lands are called Vaiśyas in this world.

85-86. Those men of the lower order who are servants and followers of the twice-born, who are bold, peaceful and have mastered their senses, and who are drivers of the plough, drawers of wood and grass are called Śûdras.

87-88. Those who have deserted practising their own duties, who are unkind and troublesome to others, and who are very excitable, envious and foolish are Mlechchhas.

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[1] There are three classes of men according to their nature and characteristics.

[2] The author has been discussing the classes of rulers and of men generally according to their characteristics which he attributes to the penances they perform. This idea about the penances leads to the theory of work as determining man's future.

प्राक्तनमपि Men might say that destiny is determined by previous birth and not by one's कर्म or work. But this is refuted by the statement that this प्राक्तन is, after all, nothing but कर्म.

[3] The praise of work introduces gradually a new basis and interpretation of the caste system.

[4] Here is an application of the theory of castes according to merits and qualifications in the case of the Brâhmaṇa. The question is asked—who is to be called a Brâhmaṇa? The answer is—not necessarily the son of a Brâhmaṇa, nor the man with certain colour-characteristic.

Having discarded the ordinary tests of birth and colour as determining the castes, Śukrâchâryya in ll. 75-85 describes the new test of merits and occupations and enumerates the various qualities of each caste.

[1] 89-90. According to the effects of work in previous births the mind of men is inclined to virtues or vices. It is not possible to do otherwise.

[2] 91-92. The intellectual disposition is generated according as the fruits of work make their appearance. The means and instrumentalities used also are such as are adapted to the predetermined Fate.

[3] 93-94. It is sure that everything happens under the influence of Prâk-karma. Hence advice suggesting commissions and omissions is useless.

[4] 95-96. Men who are wise and whose character deserves praise, greatly respect Pauruṣa or Energy; whereas the weaklings who are unable to exercise energy, to exert themselves, worship Daiva or Fate.

[5] 97-98. Of course, everything in this world is founded on both Fate and self-exertion, and this latter is divided into two classes, that done in a previous birth, and that done in this.

[6] 99-100. The strong is always the enemy of the weak. And the discrimination between the strong and the weak is made by seeing the results, not otherwise.

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[1] प्राक् कर्मफल भोगार्ह befitting अर्ह the enjoyment भोग of the fruits of previous deeds.

This treatise in praising कर्म or work as the sole factor of destiny is very particular about the work done in past lives whose effects are transmitted through successive births.

[2] The author is discussing if there is any principle governing man's course of life in this world or if the *ends* and *means* adopted by him are controlled by chance. By his theory of प्राक् कर्म he establishes the truth that previous lives determine some sort of a destiny, the कर्मफलोदय, manifestation of the effects of work and the भवितव्यता future link for men in succeeding births; so that in these births his intelligence and ways and means of action very easily and spontaneously arrange themselves. These things are pre-ordained, but not by an impersonal agent like Fate or by blind chance.

[3] कार्य्याकार्य्यप्रबोधका which explain and point out what are to be done and what are not to be done.

[4] Śukrâchâryya refers to the celebrated controversy between दैव and पुरुषकार, himself advocates the latter and disparages the former. He says the controversy resolves itself ultimately into that between weak and able men.

[5] The arguments in ll. 88-98 amount to this. Life in this world is regulated by three things—(*a*) दैव or Fate and (*b*) कर्म (पुरुषकार) or work, which again is divided into two classes—(*i*) प्राक् or done in previous life and (*ii*) इहार्जितं or achieved in this life. Of these three factors, Fate is resorted to and accused by weak and foolish people, whereas able men do not wait for the decree of Fate but make their destiny in this life and in the next by their own efforts and energisings.

[6] Of course, if there is a struggle for existence, the fitter and more powerful can be known only by their survival.

[1]101-2. *The achievement of results is not experienced by the direct process (i.e., immediately in this world). For that is the cause of* Prâk-karma (constitutes Prâk-karma and hence is visible in the next life).

[2]103-5. If sometimes great results ensue out of even small activities that is due to *prâktana, i.e.*, work done in a previous life. Some maintain that it is due to the earlier works in this life.

105. The *pauruṣa* of men is born of activities in this life.

106. It is possible to protect the lamp with its wick and oil from the wind with great care.

[3]107-8. If it is possible to have remedies to the certain destinies it is good to discard the evils by dint of intelligence and might.

[4]109-10. The prince should recognise three kinds of Fate, *viz.*, light, moderate and great, according to the favourable or unfavourable consequence.

[5]111-13. Fate was unfavourable to Râvana and Bhîṣma when the one met with discomfiture from one monkey on the occasion of *Banabhanga*, and the other from a single man at *Gograha* (on the occasion of the capture of cattle). Fate was certainly favourabla to Râghava and Arjuna.

114-15. When Fate is favourable, even small exertions achieve good results. But when it is unfavourable, great efforts may be productive of no good. Thus both Bali and Hariśchandra were bound by their charity.

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[1] Whatever a man does in this life is credited to his account for future births, so that whatever he enjoys in those births is due mainly to capital accumulated in the former. This idea is further developed in the next two lines.

[2] This is a test case to prove that results of work do not manifest themselves in this life but in the next. For otherwise we cannot explain the phenomena that even by putting forth small energy a man at times enjoys considerable good. This discrepancy between cause and effect is due to the fact that much of this effect is really the income of causes capitalised, so to speak, in the past life and lying at present in the background and hence out of one's sight.

[3] *In ll. 105-8 the author is discussing* some of the forms which Pauruṣa or Energy should take in this life. One of these is the application of skill and force to do away with and remedy the evils of this world. For it is possible to undo even the surest decrees of Fate भाविभावानां just as the lamp can be protected from the wind.

[4] Fate is either good अनुकूल, or bad प्रतिकूल as known by the fruits फलाभ्यां, But each is divided into 3 classes according to the degrees of favourableness or unfavourableness.

[5] दैव has in l. 95 been recognised as one of the factors that control human life. These lines describe the effects of Fate upon some of the historical characters.

[1] 117-18. Benefits accrue out of good deeds. Injuries come out of evil deeds. So one should know from Śâstra what is good and what is evil, and leaving the evil practise the good.

119-20. The prince is the cause of time (the maker of his age) and of the good and evil practices. By a terrible use of his engine of sovereignty he should maintain the subjects each in his proper sphere.

121-22. The kingdom is an organism of seven limbs, *viz.*, the Sovereign, the Minister, the Friend, the Treasure, the State, the Fort and the Army.

[2] 122-24. Of these seven constituent elements of the kingdom, the king or Sovereign is the head, the Minister is the eye, the Friend is the ear, the Treasure is the mouth, the Army is the mind, the Fort is the arms and the State is the legs.

125-26. I shall gradually describe the qualities of each of these limbs, which intelligent monarchs possess.

127-28. The king is the cause of the prosperity of this world, is respected by the experienced and old people and gives pleasure to the eyes (of the people) as the moon to the sea.

129-30. If the king is not a perfect guide, his subjects will get into trouble as a boat without the helmsman sinks in a sea.

[3] 131-32. Without the governor, the subjects do not keep to their own spheres. Nor does the sovereign flourish in the world without subjects.

133-34. If the monarch proceeds according to the dictates of Nyâya or Justice (Nîti) he can supply himself as well as the subjects with Trivarga or virtue, wealth and enjoyments, otherwise he destroys both.

135-36. The king called Vaiśravaṇa could rule the earth through virtue, but through sin Nahuṣa got hell.

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[1] These four lines have no connection with the discussion about Fate and Puruṣakâr above but refer to ordinary rules of morality and repeat what has been previously said about the king's functions.

[2] The analogy of the kingdom with the body of man and the description of it as the body politic or political organism, which have been made much of in modern times, are suggested here though in a quite different and fanciful way.

It is not clear what is meant by राष्ट्र and how it is an अङ्ग or limb of राज्य the kingdom or how it can stand for the legs of a human being. The analogies of the Army with the mind and the Fort with the arms are also queer and not quite comprehensible.

[3] The State is a natural and *necessary* institution. Man is a political animal and cannot prosper unless a relation between sovereign and subjects is established in the society.

[1] *137-38. Vena was ruined through vice and Pṛithu was prosperous through virtue. So the ruler should cultivate his interests by placing* virtue in his front.

139-40. The prince who is virtuous, is a part of the gods. He who is otherwise is a part of the demons, an enemy of religion and oppressor of subjects.

[2] 141-43. The king is made out of the permanent elements of Indra, Vâyu, Yama, Sun, Fire, Varuṇa, Moon, and Kuvera, and is the lord of both the immovable and movable worlds.

144. Like Indra, the sovereign is able to protect the wealth and possessions.

145. As Vâyu or Air is the spreader (and diffuser) of scents, so the prince is the generator (and cause) of good and evil actions.

146. As the sun is the dispeller of darkness (and the creator of light) so the king is the founder of religion and destroyer of irreligion.

147. As Yama is the god who punishes (human beings after death) so also the monarch is the punisher of offences (in this world).

148. Like Agni, the prince is the purifier and the enjoyer of all gifts.

149. As Varuṇa, the god of water, sustains everything by supplying moisture, so also the king maintains everybody by his wealth.

150. As the Moon pleases human beings by its rays, so also the king satisfies everybody by his virtues and activities.

[3] 151. As the god of wealth protects the jewels of the universe, so the king protects the treasure and possessions of the State.

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[1] These are some elementary notions about the king, his functions and his duties which are oft repeated in treatises like this. The only peculiarity about these passages is the reference to names of Paurâṇik kings and the attempt to make the precept concrete by alluding to their lots in life. Can these references as well as the illustrations of the fortunate and unfortunate persons mentioned in connection with वेन be said to approach a rudimentary application of the historical method in Hindu sociological thought ?

[2] The king's divine origin and extraordinary (superhuman) powers are suggested. His elements are derived from the gods. Each god bestows on him certain powers.

[3] In ll. 144-51, the functions and general attributes of the king are described, and each is attributed to the making of his body and life out of the elements of one of the gods. These lines elucidate the text in 141-3.

152. As the moon does not shine well if deprived of one of its parts, so the king does not flourish unless he has all the parts described above.

153-54. The sovereign is always possessed of the attributes of seven persons, *e.g.*, father, mother, preceptor, brother, friend, Vaiśravaṇa or Kuvera and Yama.

155. As a father provides his offsprings with attributes, (*i.e.*, by education), so the king can endow his subjects with good qualities.

156. The mother pardons offences and nourishes the children, (so also the king).

157. The Guru is an adviser to the disciple and teaches him good lessons (so also the king).

158. The brother takes out his own legal share from the ancestral property (so also the king receives his own share of the people's wealth and produce).

159. The friend is the confidante and keeper (or protector) of one's self, wife, wealth and secrets (so also the king).

160. Kuvera gives wealth (so also the king), and Yama is the punisher (so also the king).

The functions described above in the analogies with the powers of Nature may be grouped under the following five heads :—

(1) Protection of person and property (144,151).
(2) Administration of Justice (147).
(3) Spread of religion and culture (145,46).
(4) Philanthropy and charity (149).
(5) Realisation of revenues (148).

[1] Almost all the attributes mentioned in 155-60 have been implied or described in the preceding analogies. Thus the functions of the father and the *guru* may be taken under 145-46, the mother's function is partly that of Yama (147) and partly that of Varuṇa (149). Yama's function has been unnecessarily repeated. Kuvera in these lines is a giver, whereas in the preceding account is the protector of wealth. The brother's work was suggested by Agni's function. But the peculiar attribute of भ्राता as the sharer of paternal wealth is to be noted.

The only additional function of the king brought forward in these lines is that suggested by the analogy with the friend. The king should be the protector of the person of the subjects, the custodian of their women and wealth, and the keeper of their secrets. But these are the things which people generally try to keep out of the king's reach and interference except under circumstances of extreme necessity, *e.g.*, in revolutionary times or when compelled by self-interest. It is strange that Śukranīti should place such confidence in the ruler under normal conditions, for it is otherwise full of the most sound and practical advice adapted to the ways of the world.

161-62. These attributes abide in the king who is prospering. These seven qualities should never be deserted by a king.

[1] 163-64. The man who can pardon and deal out mercy (at the proper time) is really able to quell and subdue (the offenders). Without the attribute of mercy, the king cannot get on even with all his good qualities.

165-66. The king should give up his own faults and abandon unfriendly words, but should ever satisfy his subjects by gifts, bestowal of honours and good deeds.

167-70. The king who is restrained, valorous and skilled in the use of arms and weapons, who is the queller of foes and not independent of Nîti, who is a man of parts and has acquired the arts and sciences, who is not an associate of the lower classes, who has long views, who respects old men and attends to Nîti, and who is respected by meritorious men is known to be a part of the gods.

171. The king who is otherwise is a part of the demons and gets hell.

[2] 172. The attendants of the king are always according to the parts of the king.

173-74. The king abides by their actions, and is always gratified by their conduct. He cannot be otherwise because of the strength of Fate.

[3] 175-77. Effects of works done must be endured by men unless there be remedies. If remedies be procured, the effects have not to be endured to the same extent, just as a disease under treatment.

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[1] This is a very sound advice, for sometimes "a soft answer turneth away wrath." Coercion is but a very small part of government, and it is only highest statesmanship that can discover when and what to punish and when and what to pardon. Punishment, after all, is a means to an end, and the victories of kindness are more effective and lasting than those of terror. And so mercy is the crown and glory of human virtues. Shakespeare's eulogy is well-known.

[2] Like ruler, like ministers.

[3] A disease even if treated is still painful, but of course not so much as before treatment. So also if प्रतिकार be provided against कृतंकर्म or work done, the फलं may not be so much तथा as when there was no remedy प्रतिकारैर्विना But in any case the कर्म फल must be endured.

[1]178-80. Who tries or cares to abide by an advice that is the cause of evils? For the mind is gratified with only good results, nobody's heart is attracted by evil consequences. So one should follow the Śâstras after discriminating between those that treat of good, and those that treat of evil, consequences.

[2]181. Discipline is the chief thing to the guide or king. This comes through the dictates or precepts of Śâstras. This gives mastery over the senses, and one who has mastered the senses, acquires the Śâstras.

183-85. The king should first provide discipline to himself, then to the sons, then to ministers, then to servants, then to the subjects. He should never display his ability in only advising others.

186. Sometimes a king, though well qualified, may be without any subjects or rights.

187-88. But the subjects, however vicious, must not be without a king. Just as Indrânî is never a widow, so also the subjects.

189-90. Sovereignty in a kingdom is deprived of its beauty if there is the king only but there are no ministers, well-disciplined kinsmen, and restrained offsprings.

191-92. The king whose subjects are devoted, who is devoted to the protection of his subjects, and who has disciplined himself, enjoys great prosperity.

[3]193-94. One should bring to bay or discipline, by the hook of knowledge, the elephant of the senses which is running to and fro in a destructive manner in the vast forest of enjoyable things.

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[1] These lines contain an advice as to the observance and pursuit of Śâstras. Any and every Śâstra must not be followed, but a discrimination is to be made between that which is likely to promote one's interests and that which is not.

[2] नय guide. The other reading is नृप (king.)

[3] Here is a complete analogy between the processes of training elephants and the senses. Just as the elephant running to and fro in the forest and committing havoc विप्रमाथिनं all around has to be tamed by the use of the rod, so also the senses of man incessantly wandering to find gratification in the multifarious objects of the universe and causing perturbation to the soul, have to be controlled and disciplined by the application of knowledge.

This advice about the control and restraint of the senses is the fundamental and primary lesson in the Hindu system of moral education, and the simile about wild and unbroken elephants is one of the most common devices in Sanskrit literature.

[1]*195-96. The mind, covetous of the meat of enjoyable things, sends forth the senses. So one should carefully check the mind, for when the mind is controlled, the senses are conquered.*

[2]197-98. How can the man who is unable to subdue one's mind master the world extending to the sea?

199-200. The king whose heart is agitated by the enjoyable things gets into a trap like the elephant.

[3]201-2. Sound, touch, sight, taste and smell—each of these five alone is sufficient to cause destruction.

[4]203-4. The deer which is innocent, feeds upon grass and blades, and can roam far and wide, seeks death attracted by the music of the tempter.

[5]205-6. The elephant whose stature is like the peak of a mountain, and who can uproot trees with ease, is however caught because of the pleasure of contact with the female.

[6]207-8. The fly gets death by falling suddenly into the lamp because of its mad passion through gratification of eyes by the light of the wick in a mild lamp.

[7]209-10. The fish though it dives into unfathomed depths and lives in distant abodes, tastes the angle with meat for death.

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[1] The मनः or mind is an independent entity in Hindu psychology ; not a mere name for the processes of consciousness produced by the sensations and perceptions through the organs of senses, but a separate organ like the five senses, having its own function to discharge. The मनः is the director or conductor of the five organs of sensation, as described here ; these have to work under its guidance.

विषय A technical term in Hindu Psychology and Ethics often used in this treatise in connexion with moral topics, *e.g.*, training of character, discipline, etc. There are five विषयs, *viz.*, रूप (sight) शब्द (sound), गन्ध (smell), रस (taste) स्पर्श (touch), *i.e.*, the five classes of objects in the universe which can be perceived through the five different organs of sensation. These five विषयs constitute the whole universe of material objects and enjoyable things that fall within the physical reach of man.

The analogy here is between meat and विषय.

[2] Just as charity begins at home, so also conquests begin with self. The capacity for mastery over a kingdom is proved by the ability to conquer one's own self.

[3] The विषयs are enumerated here, and in the next few lines the evil consequences of each are described.

[4] Here is the pernicious influence of sound शब्द illustrated by the case of the deer which is otherwise quite innocent.

[5] Here is the baneful influence of touch or स्पर्श illustrated by the case of the elephant who is otherwise very powerful.

[6] Here is the danger from रूप or sight illustrated by the case of the fly.

[7] The fish is the object lesson for danger from taste or रस.

[1] 211-12. The bee which has the power of cutting holes, and can fly with wings, gets however caught within a lotus because of its desire for smell.

[2] 213-4. These poison-like *Viṣayas* are each capable of ruining men. Cannot the five combined cause destruction ?

[3] 215-16. Indulgence in gambling, women and drinking, when undue, produces many disasters ; but when within due limits, gives rise to wealth, sons, and intelligence.

[4] 217-18. Nala, Dharma (Yudhiṣṭhira) and other kings were ruined through honest gambling, but gambling with dishonesty is productive of much wealth to those who know it.

219-20. Even the name of females is captivating and agitates the mind. What to speak of the effect of sight of those whose brows are luxuriously decorated ?

221-22. Whom does not a woman subdue, who is skilled in the art of secret conversation, who talks soft and sweet, and whose eyes are red ?

223 24. The woman can subdue with passion the heart of even the ascetic who has conquered the senses. What to say of men whose senses are not controlled ?

225-26. Many princes have been ruined through attachment to women, *e.g.*, Indra, Dandakya, Nahuṣa, Rāvana and others.

[5] 227-28. The wife of a man who is not extremely attached to her is for his happiness. For without her there is no other companion in domestic work.

229. Of the man who drinks wine excessively, intelligence disappears.

[6] 230-31. Wine, drunk according to some measure, increases the talent, clears the intelligence, augments patience and makes the mind steadfast ; but otherwise it is ruinous.

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[1] The bee illustrates the danger from गन्ध or smell. The lecture on the necessity for control of the senses and the practice of self-restraint is in ll. 201-12 very ably and poetically delivered and reaches its climax in the next two lines.

[2] The whole description is a very clear and concrete presentation of the nature of विषयs and the processes of the working of passions, and a great power of observation is implied in each case. Three important professions have been indicated in the above lines—(1) deer-catching by the hunter, (2) elephant catching, and (3) angling.

[3] Each of these three passions has both its uses and abuses. अयुक्तं—Undue, immoderate, excessive. युक्तियुक्तं—due and moderate.

[4] Thus gambling has both its uses and abuses.

[5] Thus the woman also has both uses and abuses.

[6] Thus Drinking is both good and bad according to circumstances. All along in this description the author is advocating the Rule of the Golden Mean : 'Avoid Excesses.'

[1]232. Sensuousness and anger are like wine and should be duly used—the former in the maintenance of the family, the latter against enemies.

[2]234. Cupidity should be indulged in by a king who wants victory in the of the army.

[3]235-36. But princes should not indulge in sensuousness with regard to other's wives, cupidity in other's wealth, and anger in punishing their own subjects.

[4]237. Can a man be said to have a mate when he takes to another's wife? Can anybody be called a hero who punishes his own subjects? Can a man be called wealthy through somebody else's wealth?

[5] 239-40. The gods ruin and cast down the king who is not a protector, the Brâhmaṇ who is not a performer of penances, and the rich man who is not charitable.

241-42. Sovereignty, the position of a giver and opulence are the fruits of penances; and the fruits of sins are begging, slavery and poverty.

243-44. Having observed the Śâstras and duly governed one's own self, the king should discharge his duties for happiness in this world and the next.

[6]245-48. Punishment of the wicked, charity, protection of the subjects,

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[1] Śukrâchâryya's system does not blindly advocate the absolute inhibition of the passions and the strict asceticism which leads to the killing of the senses. In it, there is a place for gambling, drinking, woman, anger, sensuousness and other indulgences. He gives the devil his due, and does not forget the good to be derived from, and the uses that can be made of, even gambling and drinking. His morality is austere but not inhuman, and is adapted not to the abstract human beings shut up in a convent but to the complete men with all their passions and sensibilities, discharging their thousand and one duties in this world. Śukrâchâryya thus arrives at a system that is calculated to bring about the harmonious development of all faculties of man without repressing or unduly pushing forward any one.

[2] Thus काम क्रोध and लोभ, passions which are ordinarily supposed to be the greatest enemies of moral nature have, according to Śukrâchâryya, their own parts to play in human life and are not absolutely the unalloyed vices they are painted to be.

[3] These are sufficient checks to the wantonness of the three passions. They are allowed within these limits. Beyond these they become vices.

[4] The advice is 'Be married,' 'Be heroic,' 'Be wealthy.' But taking to another's wife is no marriage, oppressing one's own people is no heroism, and getting another's wealth is no richness.

[5] The proper functions धर्मs of the three classes of men are here described.

[6] भूमेरुपार्जनं—Income to be derived from land by the king. The agricultural, (and other economic) functions are prescribed in this phrase.

करदीकरणं राज्ञां—Independent princes to be made dependent and tributaries. The king should always try to be an overlord by conquering kingdoms and establishing an empire over them, so that their chiefs may be made to pay homage. The advice is imperialistic. The other functions are ordinary and have been often mentioned in the treatise.

performance of Râjasûya and other sacrifices, equitable realisation of revenues, conversion of princes into tributary chiefs, quelling of the enemies and extraction of wealth from land—these are the eight functions of the king.

249-50. Those kings are almost like oxen (*i.e.*, fools) by whom their strength (Army) is not increased, by whom princes are not made to pay tribute, and by whom subjects are not well protected.

251-52. The most miserable king is he whom the subjects look upon with terror and disrespect, and who is deserted by both rich and virtuous men.

[1]253-54. The king who is much attached to actors, musicians, prostitutes, athletes, oxen and lower castes deserves ignominy and is exposed to enemies.

255-56. The king who is inimical to the intelligent, who is pleased with cheats, and does not understand his own faults, creates his own destruction.

257-59. When the king does not pardon offences, but is a great punisher, is the robber of men's wealth, and oppresses the subjects on hearing of his own faults, the society gets disturbed and disorganised.

[2]260-65. By making the secret spies keep information as to who are accusing his conduct, in what light the ministers and others who know it are viewing it, what is the extent of satisfaction and who are discontented with him owing to his virtues and vices, and hearing everything from them in secret, the king deserving praise should always know his own faults from the standpoint of the subjects and get rid of them, but never punish the people.

266-67. If when a king is made by the spies to hear "People dispraise you, O king," he gets angry through wickedness, he hides his own faults.

268-69. Even the chaste Sitâ was forsaken by Râma owing to his dispraise among the subjects. Even a small punishment was not meted to a certain रजक by one who was able to do so.

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[1] Śukranîti lays special stress on the king's own discipline and self-restraint. The greatest of his functions is considered to be ruling himself. The importance of this moral training to the king is constantly mentioned in the treatise.

[2] Having described some of the virtues and vices of kings the author is suggesting some of the processes by which they should try to rectify themselves. One of the most important rules of morality for the king is that which regulates his relations and dealings with the subjects, and therefore a correct estimate of their opinion and criticism is the first step to the king's moral discipline.

The spies have to be appointed not only against the subjects, but also against the the king himself and on behalf of the subjects. This Intelligence Department is to be regarded as the instrument for bringing public opinion to bear on the king's public activities.

[1]270-74. *Even when immunity is declared by a* king, educated in the arts and sciences, nobody can dare speak out even his serious offences in his presence. Besides it is heard that the gods such as Viṣṇu also are fond of praise. What then to speak of the men? Dispraise always creates anger. Hence the king should be ever merciful, **क्षमागदवशी** and affectionate.

[2] 275-76. Youth, life, mind, beauty, wealth, sovereignty—these six are very inconstant. Knowing this, one should be religious.

277-78. The subjects desert a king who is uncharitable, who insults men, who practises deceit and uses harsh words, and who is severe in punishments.

279-80. People do not take to a king who is very cowardly, procrastinating, very passionate, and excessively attached to the enjoyable things through ignorance.

281. But the people are satisfied with the opposite qualities.

282. One demerit spreads ill fame, cannot a combination of faults do it?

283-84. Hunting, dice-playing and drinking are condemnable in kings. Dangers from these are illustrated in the cases of Pându, Naiṣadha and Vṛiṣṇi respectively.

285-86. Sensuousness, anger, ignorance, cupidity, vanity and passion—one should give up these six. These being given up, the king becomes happy.

287-90. King Dandakya went to the dogs by taking to one of these six enemies, *viz.*, sensuousness, Janamejaya through anger, Râjarṣi Aila through cupidity, Asura Bâtâpi through folly, Râkṣasa Paulastya through vanity, and king Dombhodbhava through passion.

[3]291-92. But the powerful Jâmadagnya and the fortunate Ambarîṣa ruled the world for a long time by giving up these six enemies.

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[1] Two grounds are advanced for asking the king to take special care to be merciful to those who are censurers and detractors of his conduct. In the first place, the king is not likely to get full information about his own faults, for people can never be bold enough to speak the truth. In the second place, it is very difficult to put up with public censure and dispraise— Fame being the last infirmity of human character.

[2] This precept has no connexion with the preceding or the following.

[3] Having in ll. 259-74 described the rules of public morality that the king has specially to observe, Śukrâchâryya gives an account of the faults and vices that men in general commit in individual lives and which also the king must guard against. This ethics of individual life is illustrated by concrete references to the cases of kings, Ṛiṣis, Asuras and Râkṣasas.

293-94. Augmenting virtue and wealth which are pursued by the good with care, and controlling his senses, the king should worship his preceptor.

295-97. Association with the *guru* is for the acquisition of the Śâstras, the Śâstras are calculated to increase knowledge ; the king who is trained in the branches of learning is respected by the good, and does not incline to wrong deeds even if impelled by evil motives.

[1]298-300. The wise king by daily acquiring the various branches of learning, practises only those works which are known to be virtuous according to Śruti, Smṛitis, tradition and self-deliberation.

301-2. Of the monarch who has conquered his senses, and who follows the Nîti Śâstra, prosperity is in the ascendant and Fame reaches the skies.

303-4. Anwikshiki (Logic), the Trayî (3 Vedas), Varta (Economics) and Dandanîti—these four branches of learning the king should always study.

[2]305-8. The science of discussion and Vedânta are founded on the science of Anwikshiki ; virtue and vice, as well as interests and injuries of man are based on the Trayî, wealth and its opposite on Varta, good and bad government on Dandanîti. Thus all the castes of men and the stages of human life sre built upon these sciences.

[3]310-11. The six Aṅgas, the four Vedas, Mîmâṃsâ (system of philo-

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[1] Four means are mentioned here for determining the धर्म (1) श्रुति *i.e.*, Revealed literature, *e.g.*, the Vedas ; (2) Smṛiti, *e.g.*, Dharma Śâstras (3) लोकवृत्त: Tradition and custom, consensus of public opinion (4) मनसा साधु निश्चितं cogitation in the mind, *i.e.*, introspection, discussion and deliberation.

[2] In ll. 303-8 Śûkrâchâryya has enumerated and briefly described the scope of the four fundamental branches of learning. In the next few lines each is being fully explained.

[3] अङ्गानि, six limbs of the Vedas, they are called. They are auxiliaries and supplements to the Vedas. A preliminary training in them is required to acquire mastery over the Vedas, for they treat of the grammar, phonetics, mathematics, etymology, &c., used in the Vedas.

मीमांसा the common name of two of the six systems of philosophy in Hindu Literature. They are (1) Pûrva Mîmâṃsâ or simply Mîmâṃsâ propounded by Jaimini dealing with the rituals of religion, and (2) Uttara Mîmâṃsâ or Vedânta, dealing with esoteric religion. In this line the first is meant, for Vedânta has been included in Anwikshiki or Logic in l. 305.

पुराणानि These are 18 in number, constituting the whole system of Hindu theology and mythology and forming an encyclopædia of the learning and wisdom of the ancient Hindus.

त्रयी, *i.e.*, trio of sciences—comprising the first three Vedas, the Atharvan is not a Veda but rather a more appendix to them all. Here Śukrâchâryya gives a special meaning to it, sophy,) Nyâya (system of philosophy), Dharma Śâstras as well as the Purâṇas—all these constitute the Trayî.

[1] 311-12. In Varta are treated interest, agriculture, commerce and preservation of cows. The man who is well up in Varta need not be anxious for earnings.

313-14. Danda is restraint and punishment, hence the king is also known to be Danda. The Nîti that regulates punishment constitutes Dandanîti, Nîti so called because it governs and guides.

[2] 315-16. Man gives up both pleasure and pain through Anwikshiki and the science of self (metaphysics) and gets both temporal and spiritual self-realisation through the Trayî.

317-18. As kindness is a great virtue among men, so the king should rule the poor people with kindness.

319-20. The king should not oppress the poor people seeking his own interest. For they, dying through repression, ultimately ruin the king.

321-22. One should asssociate with the good people both for virtue and happiness. One who is respected by the good attains great prosperity.

323-24. The man who is attended by good men gratifies the heart in the same way as the moon with its cool rays pleases the tank with its newly blossomed lotuses.

325-26. One should abandon the company of bad men which is terrible like the desert scorched by the summer sun, frightening and inhospitable.

327-28. One should associate rather with snakes whose mouths contain poison, and whose faces have been darkened by the smoke of fire exhaled by their breathings, but never with bad men.

[3] 329-30. By one who desires good, the bad man should be accorded even a better treatment than the signs of honour meant for good persons who are to be worshipped.

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[1] *Varta* is thus a practical science prescribing rules for the maintenance of family.

[2] Having previously described the system of moral education for a king both as the head of the State and as a private individual, in ll. 295-316 Śukrâchâryya has drawn up a syllabus of intellectual training and explained the content of each branch of learning with its utility to man.

[3] Lines 321-30 contain ordinary precepts about companionship in powerful language.

331-32. One should always please the world by words that can captivate the heart. Even the man who gives away wealth in charity terrifies the people if he uses harsh words.

333-34. The wise man, even if he be oppressed, should not use such words by which men feel pain as if pierced at heart.

335-36. Pleasant words ought to be used whether to good men or to enemies. The man who is popular speaks sweet words like the notes of the peacock.

337-38. The voices of the drake red with passion, the cuckoo and the peacock are not so attractive as those of the good and wise

339-40. Those who speak pleasant words and wish good deeds are praiseworthy and prosperous, in short, they are gods in human form.

[1] 341-42. There is no such art of subjugation in the three worlds as Mercy, Friendship, Charity and Sweet words.

343-44. One should worship the gods with a heart purified by faith in them, treat the seniors as gods, and the equals as himself.

345-46. One should make favourable the seniors by salutations, the good people by well-behaved dealings, and the gods by good deeds.

347-48. One should attract the friends and relatives by good behaviour, the wife by love, the servants by offering distinctions, and others by gifts.

349-50. The man who is powerful, intelligent and valorous enjoys the earth full of its wealth, and such a king becomes the lord of this world.

351-53. Prowess, strength, intelligence and valour—these are great qualifications. The king who has other qualities but not these, though he is wealthy, cannot enjoy even a small region, but is soon thrown down from his kingdom.

[2] 354-55. Superior to the very wealthy king is the monarch, who, though small in territory, has his commands unobstructed and is powerful. He can be such with the qualifications (mentioned above).

356. Men who are other than kings are not competent to (rule and) beautify the earth (land).

357-58. The earth (land) is the source of all wealth. For this earth (land) kings can lay down even their lives.

359-60. Wealth and life are preserved by men for enjoyment. But what avails a man to have wealth and life who has not protected the land?

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[1] Lines 331-42 contain the rules for regulating one's speech in an extravagant style.

[2] It is not size that is the strength of a State. But discipline and able management (as अव्याहताज्ञ implies) and military efficiency are the two principal conditions of the importance of a kingdom.

361-62. Accumulated wealth can never be sufficient for any amount of expenditure. Truly, without perpetual incomes nobody's, not even Kuvera's, (is sufficient).

[1] 363-64. The king is honoured because of these qualities. It is not birth that makes a king. He is not respected so much because of his ancestry, as for his prowess, strength and valour.

[2] 365-67. That ruler is called a Sâmanta in whose kingdom without oppressing the subjects, an annual revenue from one lakh up to three lakh *Karṣas* is regularly realised.

[3] 368-74. That ruler is called a *Mândalika* whose annual revenue exceeds three lakh *karṣas* up to 10 lakhs. The *Râjâ* is he whose income exceeds 10 lakh *karṣas* up to the 20th lakh. The *Mahârajâ* is he whose income reaches to the 50th lakh. The *Swarât* is he whose income exceeds the last up to a crore. The *Samrât* is he whose income exceeds a crore up to 10 crores The *Virât*, whose income goes beyond that to the 50th crore. The *Sârvabhauma*, who is above that and to whom the earth with its seven islands is ever bound.

[4] 375. The ruler has been made by Brahmâ a servant of the people getting his revenue as remuneration. His sovereignty, however, is only for protection.

377-78. Those servants who have been appointed equal with *Sâmantas* and others are also to be known as *Sâmantas*, etc. in succession and to be sharers of the royal income.

379-80. Those who have been deprived of the post of the *Sâmantas*, etc., but who are maintained by the *Mahârâjas* and others at the same salary are called *Under-Sâmantas*, etc.

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[1] Not heredity but personal qualifications constitute the sole title to kingship.

[2] **कर्ष** = 80 *ratis*, thus less than a Rupee or tola, for a tola is equivalent to 96 *ratis*.

So a **सामन्त** is a king whose annual revenue in terms of modern Indian Currency would be between Rs. 83,333 and Rs. 250,000

[3] The grades of kings according to modern Indian standard :—

सामन्त	between	Rs.	83,333	and	250,000	**स्वराट्**	between	Rs.	4,166,666	and	8,333,333
माण्डलिक	„	„	250,000	„	833,333	**सम्राट्**	„	„	8,333,333	„	83,333,333
राजा	„	„	833,333	„	1,666,666	**विराट्**	„	„	83,333,333	„	416,666,666
महाराजा	„	„	1,666,666	„	4,166,666	**सार्वभौम**	above	„	416,666,666.		

[4] The king is a master only in the sense that he is to protect the people's interests, and not that he can enjoy any rights and privileges or that he can treat the people in any way he likes. His position is rather that of servitude (**दास्यत्व**.)

भाग share of national produce, royal income, revenue ; **भृति** remuneration, wages, the revenue is the *salary* the king receives for his services to the people.

381-2 The governor of 100 *Grâmas* is also called a *Sâmanta* The man who is *appointed* by a king over 100 *Grâmas* is called a *Nṛi-Sâmanta.*

[1]383-4. The man who is appointed over 10 *Grâmas* is known as *Nâyaka.* The *Âśâpâla* is he who enjoys the revenue of *Ayuta* (10,000) *Grâmas*, also known as *Swarât.*

385-6. A *Grâma* is that piece of land whose area is a *cros*, and whose yield is 1,000 silver *Karṣa.* The half of a *Grâma* is called *Pallî,* the half of a *Pallî* is *Kumbha.*

387-8. A *Croś*, according to Prajâpati (Brahmâ), is 5,000 cubits, according to Manu, it is 4,000 cubits.

389-90. The area of a *Croś*, according to Brahmâ, is two *Crore* and a half cubits; or 2,500 *Parivartanas.*

391-2. An *Angula* is the length of the middle bone of the middle finger, 8 *Yavodaras* by length and 5 by breadth.

393-4. A Cubit or *kara*, according to Prajâpati, is made up of 24 *angulas.* This standard is the best for land measurements, other standards are inferior.

395-6. A *Danda* is the equivalent of 4 *karas* (cubits) and also 5 cubits. The *Angula* of the *kara* (cubit) for measuring *Danda* and *Laghu* is 5 *yavodaras* (and not 8 as above) according to Manu.

[2]397-8. A *Danda*, according to Prajâpati, is 768 *yavodaras*; according to Manu, 600 *yavodaras.*

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[1] **Grades of Royal officers described in order of income—**

सामन्त **(1) Officer with salary equal to the income of a *Sâmanta* as described in the gradation of rulers.**
(2) Independent ruler of 100 *Grâmas.*

हीनसामन्त **Salary same as that of *Sâmanta*, but post subordinate.**

नृसामन्त—Officer who is the head of 100 ग्रामs.

नायक **Officer who is the head of 10 ग्रामs.**

आशापाल-स्वराट्—Officer who is the head of 10,000 ग्रामs.

[2] **वसुषड् मुनिसंख्या—In this number वसु stands for the figure 8, because there are 8 *Vasus* in the Universe, and मुनि stands for figure 7 because there are seven Rishis. Hence the number seems to be 867. But by the rule (अंकस्य वामागतिः figures move from the right leftwards) the figure 8 will be the first digit, and 7 the third. Hence the number is 768. And this according to calculation of Prajâpati. Thus**

दण्ड = 4 cubits.
= 4 × 24 *Angulas.*
= 4 × 24 × 8 *Yavodaras* = 768 *Yavodaras.*

According to Manu's calculation :

दण्ड = 5 × 24 × 5 = 600 *Yavodaras.*

399. The *Nivartana*, according to each, is 25 *dandas*.

[1]400-1. According to Manu, a *Nivartana* is equivalent to 3,000 *angulas*, 15,000 *yavas*, or 125 cubits.

402-4. According to Prajâpati, a *Nivartana* is equivalent to 19,200 *yavodaras*, 2,400 *angulas*, and 100 cubits.

405-6. According to both systems the area of a *Nivartana* is 625 *dandas*, for on each side are 25 *dandas*.

407-8. A *Parivartana* is made up of 75,000 *angulas* according to Manu, 60,000 *angulas* according to Prajâpati.

409-10. According to Manu, a *Parivartana* is 3,125 cubits; according to Prajâpati it is 2,500 cubits.

[2]411-2. According to Manu, a *Parivartana* is 4 lakh *yava* minus $\frac{1}{4}$ lakh; according to Prajâpati, it is 80,000 over 4 lakh *yavas*.

413-4. According to Manu, thirty-two *Nirartanas* would make 4,000 cubits or 800 *dandas*.

[3]415-6. *Bhuja* or one side of a *Parivartana* is twenty-five *dandas*. The area, therefore, is an *ayuta karas*.

[4]417. The *Parivartana* of cultivated land is four *Bhujas*.

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[1] **त्रिपंच** = 15, **सपादशत** = 100 + $\frac{1}{4}$ of 100 = 125. A **पाद** is a quarter.

[2] Parivartana (1) = 4 lakh − $\frac{1}{4}$ lakh = 400,000—25,000

= 375,000 yava.

(2) = 400,000 + 80,000 = 480,000 yava.

[3] **परिवर्त्तन** Equivalent to **निवर्त्तन**; for the area 10,000 cubits would give as one of its sides by square root 100 cubits, or 25 *dandas* and this is the measure of a **निवर्त्तन** (l. 399).

[4] 1 **भुज** = 25 Danda = 100 cubits.

∴ 4 **भुज** = 400 cubits.

The difficulty of interpretation arises from the fact that a line and an area have been indicated by the same term without special care to explain the use.

N.B.—The standard of measurements in ll. 386-417 :—

	Prajâpati.	Manu.		**Measure.**
(*a*)	8 Yavas	5 Yavas	=	**1 Angula.**
	24 Angulas	24 Angulas	=	**1 Cubit.**
	4 Cubits	5 cubits	=	**1 Danda.**
	. 768 Yavas	600 Yavas	=	**1 Danda.**
(*b*)	5,000 cubits	4,000 cubits	=	**1 Crosa.**
	. 5,000 × 5,000			
	or 25,000,000 sq. cub.	16,000,000 sq., cub.		**Area of Crosa.**
(*c*)	2,500 Parivartanas			**Area of 1 Crosa.**
	. 10,000 sq. cub.,			**Area of 1 Parivartana.**
	. 100 cub.*			**Side भुज of Parivartana.**

* Nivartana = Parivartana. (*Cf.* l. 399 and l. 415),

[1]418-19. The ruler should always realise his share (revenue) of produce from land according to Prajâpati's system ; but in times of danger and difficulty, according to Manu's system, not otherwise.

[2]420. The ruler who extracts his share through cupidity (*i.e.*, beyond his dues) is ruined with his subjects.

[3]421-22. One should not give up even an *angula* of land in such a way as to part with rights to it ; may, however, give away (to persons) for their maintenance, but so long as the receiver lives.

[4]423-24. The wise man should always give away lands for the gods, for parks and public grounds, and for dwelling houses to the peasants.

	Prajapati.	Manu.	Measure.
(*d*)	25 Dandas ...	25 Dandas ...	1 Nivartana.
	∴ 25 × 768 Yavas	25 × 600 Yavas	1 Nivartana.
	or 19,200 Yavas ...	15,000 Yavas ...	
	Again 25 × 4, *i.e.*, 100 Cubits*	25 × 5, *i.e.*, 125 Cubits ...	1 Nivartana.
	So also 25 × 4 × 24 Anguls	25 × 5 × 24 Anguls	1 Nivartana.
	i.e., 2,400 Anguls ...	3,000 Anguls ...	
	So also 25 × 4 × 24 × 8 Yavas	25 × 5 × 24 × 5 Yavas	1 Nivartana.
	or 19,200 Yavas ...	15,000 Yavas ...	
(*e*)	25 × 25 Sq. Dandas	25 × 25 Sq. Dandas	Area of Nivartana.
	or 625 Sq. Dandas ...	625 Sq. Dandas ...	
	625 × 4	625 × 5	Area of Parivartana or Nivartana.
	or 2,500 Cubits ...	3,125 Cubits ...	
	∴ 2,500 × 24 Angulas	3,125 × 24	Area of Parivartana or Nivartana.
	or 60,000 Angulas ...	75,000 Angulas ...	
	∴ 60,000, × 8 Yavas	75,000 × 5 Yavas	Area of Parivartana or Nivartana.
	or 480,000 Yavas ...	375,300 Yavas ...	
(*f*)	1 00 Cubits	125 Cub. ...	1 Nivartana.
		125 × 32 Cub.	32 „
		4,000 Cub. ...	
		$\frac{4000}{5}$ or 800 Dandas ...	32 „

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[1] Since Manu's standard is lower than Prajâpati's, revenue realised according to the former would be higher than that on the latter's system. Realisation on Manu's system would, therefore, inflict great hardships on the subjects. Hence the injunction that in ordinary times Prajâpati is to be followed. But, under exceptional circumstances, when there may be a great demand for money the king may use Manu's calculation and thus practically enhance the rates of payment. In short, Manu's system is to be reserved as a safety-valve by way of imposition of a kind of tax, so to speak, under abnormal conditions.

[2] This is an advice against arbitrary and exorbitant taxation which is a great hindrance to the development of national resources and hence the cause of political and military inefficiency.

[3] Gifts of land with certain restrictions allowed, but no abandonment of rights on ordinary occasions.

[4] **Land Laws (417-24) :—**

(1) Land revenue to be realised ordinarily, according to Prajâpati's standard, but under circumstances of financial pressure, to the system of Manu.

(2) Realisation of revenue must never be arbitrary or exorbitant.

(3) Rights to land never to be given up.

(4) Gifts of land to poor people allowable for life only.

(5) Various conditions of gifts—

(i) For gods, (ii) For public walks, (iii) For the residences of peasants (कुटुम्बिनं?)

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* Nivartana—Parivartana (cf. I. 800 I. 415)

[1]425-28. In a place that abounds in various trees, plants and shrubs and is rich in cattle, birds and other animals, that is endowed with good sources of water and supplies of grains, and is happily provided with resources in grasses and woods, that is bestirred by the movements of boats up to the seas, and is not very far from the hills, and that is an even-grounded, picturesque plain, the ruler should build his capital.

[2]429-30. Which is to have the beautiful shape of a half moon or a circle, or a square, is to be surrounded by walls and ditches, and must contain sites for *Grâmas* or other divisions.

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[1] This description about the points to be noted in the selection of a site for **राजधानी** or capital contains a magnificent account of the ideals of material existence that, according to Śukrâchâryya, should be present in the mind of the ruler of a State, and gives an idea of the standard of perfection in secular and earthly life that the ancient Hindus or, at any rate, the wisest men among them, could conceive for the happiness and well-being of man.

वृक्षलता &c., the place must be well-wooded. The climatological and economic importance of forests and the evils of deforestisation have been receiving sufficient recognition in modern times

पशुपक्षी, &c.,—the province in which the capital is to be built up must be rich in games and abound with the resources of the animal world.

उदकधान्य Referring to the agricultural opportunities of the country. There must be a splendid network of rivers and waterways intersecting it.

तृणकाष्ठ—For fodder and fuel.

सिन्धुनौ– There are 3 points to be noted here. In the first place, communication with the sea is necessary; secondly, the use of boats; thirdly, the place must be **आकुल** *i.e.*, agitated or bestirred and moved by the arrivals and departures of the vessels,—referring to the great number of plying and active boats and the bustle of brisk commercial life.

The proximity of the sea to the capital city, or at any rate, the importance of keeping communication with it, was recognised by the ancient Romans also in the matter of a site for their "city of seven hills." They selected a place which was "near to, yet far from, the sea;" and much of the importance of Rome was ascribed to this condition.

महीधर—The hills also must be near—referring to the mineral and other resources peculiar to them which must be within easy reach of the capital. **समभूदेश**—a plain. According to Śukrâchâryya the hills must be near but not include the capital which is to be a part of the plains.

The chief city, as described above, must have the advantages of the hills, plains and seas, command the vegetable, animal and mineral resources of the country, and be a centre of quick commercial activity. This account, even if it be considered to be ideal likely to be realised in the land of "Nowhere" does certainly anticipate, like the *Utopia* of Sir Thomas More, some of the important principles followed in the construction of modern capital cities.

[2] Having given an account of the province the author describes the shape and boundaries and suggests the size of the capital city. **सुशोभना**—Whatever be the shape, semi-circular, circular or square, it must be beautiful. Beauty is never lost sight of. So also the province in which it is to be situated has been described to be **सुरम्य** or picturesque (428).

[1] 431-3. Which is to have the Sabhâ or Council Buildings in the centre, must ever be provided with wells, tanks and pools, which is to be furnished with four gates in the four directions, and which is to have good roads and parks in rows, and well constructed taverns, temples and *serais* for travellers.

434. Having built (such a capital), the king, well protected, should live there with his subjects.

[2] 435-7. The palace is to be in the midst of the Council Buildings must have stables for elephants, horses and cattle, is to be well adorned with spacious tanks, wells and water-pumps, is to have sides of equal length in all directions and to be high southwards and low northwards.

प्राकार,—walls. **परिखा** ditches. The capital must be well protected and self-sufficient. This has been the ideal of all Indian cities in ancient and mediæval times. No town is mentioned without its walls and ditches.

ग्रामादीनां -must have within it space for the laying out **निवेशिनी** of *Grâmas*, *Pallis*, *Kumbhas*, etc. A **ग्राम** does not mean what is implied by a modern village. It is a technical term for a locality with certain definite measurements. Its area, as defined above, is 25,000,000 sq. cubits, that of a *cros*, *i.e.*, which is something above 2 modern sq. miles.

The *Grâmas*, &c., must mean here the wards, districts and divisions into which a capital city is divided. Śukrâchâryya's capital must be big enough to contain several such divisions.

[1] These lines contain an account of the internal arrangements of the town.

सभा The scene of political activity must be easily accessible to all, hence to be located in the central position.

कूप—Provision for drinking water must be adequate.

मार्ग etc.,—describing not only the means of communication and the places of public resort and amusements, but suggesting by the word **वीथि** (lines or rows), the great extent and area of the city. There must be many roads; and these are to be parallel to one another both in the straight and transverse lines. And as the parks also must be laid out in rows and necessarily many in number, the implication is that the city is very large and populous. Vâlmîki in his account of Ayodhyâ under King Daśaratha, has described such rows of roads intersecting one another at right angles. Sir Thomas More's ideal description of the roads in *Utopia* does not surpass these accounts.

[2] As the **सभा** is so centrally situated with regard to the people of the capital, so the **राजगृह** is to be centrally situated with regard to the **सभा**.

गजाश्व—The stables must not be outside the palace. **गव**—The cows are of daily service to the Hindu family and hence must be within the palace compounds. **वापी** The palace must have its own tanks and pools and be a self-sufficient unit in the supply of water for baths and drinks.

जलयन्त्र—Mechanical instruments, pumps, spouts and other devices for raising and distributing water, or otherwise decorating the gardens as ornamental tricks.

समभुजं—The palace is to be a uniformly built structure, all its sides being of the same dimension, but its shape is not given here.

[1]438-9 The palace is to have many and odd number of sides excepting the ordinary buildings. For ordinary buildings, unless they form a square among themselves, do not look well.

[2]440-1. The palace is to have walls guarded by sentinels equipped with arms and weapons and defended by strong machines, should have three court-yards and four beautiful gates in four directions.

[3]442-3. The palace is to be watched both during day and at night by four, five or six well-armed guards placed in each court-yard and acting in rotation every *yáma* (*i.e.*, 3 hours).

[4]444. The king should furnish the palace with various houses, tents, rooms and halls.

[5]445-6. Towards the east, the king should have houses for the washing and cleaning of clothes and other things, for baths and for worship, and for dining and cooking.

[6]447-9. For sleep and entertainments, for drinking as well as weeping, for grains and grindstones, for servants and maids, as well as for committing nuisances, houses should be built in order towards the south.

[7]450. Houses should be built towards the west for cows, deer, camels, elephants and other animals.

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[1] For ordinary purposes a square should be formed by four houses, two on each side, so that one may face the other in each direction. But this sort of चतु:शाल is not to be the plan for the construction of the royal residence. It is not to be an ordinary शाला and should be नैकभुज, have many sides and be बिसमबाहु, have odd number of arms, *i.e.*, 3 5, 7, &c. The shape of the palace thus seems to be that of a "regular" pentagon or septagon.

The construction here is confused.

[2] सुब्दुयंत्रकं—The royal residence should have machinery for protecting it from enemies.

[3] Arrangements for defence of the palace:

(1) Walls with sentinels.

(2) Guards in each court-yard. Watchmen to work both during day and night each for 3 hours.

यामिकै:—*i.e.*, those who have to work for a *yama* or the 8th part of a day.

परिवर्तकै:—*i.e.*, rotating, by those who work in turn or succession.

[4] These rooms are mentioned below with the special purposes for which each is intended.

[5] So the eastern houses or rooms are set apart for the supply of the primary necessaries of life.

[6] It is difficult to find what is the propriety of setting apart these southern buildings for the purposes mentioned above. In ll. 435-37 the southern side has been described as higher than the northern. Perhaps the former is meant for private and domestic purposes, the latter for public and political, cf. ll. 454-58 below.

There are to be separate rooms for drinking and weeping also. Drinking was, in fact, a recognised practice among the kings.

[7] So the whole western side is reserved for the cattle.

[1]451-3. The northern rooms are built strong and beautiful for chariots, horses, arms and weapons, gymnasium, watchmen, for clothes and provisions, as well as for the study of the branches of learning.

[2]454. Or the king may build these houses according to his will.

[3]455. The king should build the court house and the museum to the north of the palace.

[4]456-7. The height of the wall of a room is to be one-fifth more than its length. The wall is to be wide to the extent of one-sixth of the room.

[5]458. The above is the measure for a house of one floor, for (houses of) more (than one floor) the measure will rise accordingly.

459-60. One should separate the rooms by pillars or walls. A house is to have three, five or seven rooms.

461-2. The house is to be broken at eight places for doors. Two doors in each of the four sides are efficacious in giving wealth and children to men. (?)

463-4. The doors must be placed there, and not anywhere else. But windows in each room may be placed according to one's liking.

[6]465-6. One should not have a door just obstructed by the door of another's house, or a tree, an angle, a pillar, a road, a stand, or a well.

467. Obstructions to roads must not be at the gate of a palace or a temple. (?)

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[1] It is easy to understand why all these houses are to be strong, well built and well protected सुगुप्तं । They are to be of constant use to them, and some of them are the stores and magazines. And the necessity for making them सुमनोहरान् or magnificent arises from the fact that these being signs and indications of the ruler's wealth and position are likely to be visited by friends, guests and sight-seers. The other houses need not be so well decorated and beautiful as they are for private purposes and hence not worth visiting.

The peculiarity in this account is that it mentions not only the school-room, the temple, the gymnasium, the store-house and the magazine but also almost all such buildings as may be necessary to men for the ordinary affairs of life.

[2] This statement giving the king an option to follow any order seems to indicate that the philosopher's own prescriptions as to the selection of the sides for the various buildings are based on logical principles regarding health or convenience.

[3] Having in ll. 435-55 described the palace, the author suggests the site of other buildings, but mentions only two.

शिल्पशाला—Hall of Arts, a workshop or a museum.

[4] *Here is a bit of civil engineering.*

भित्ति—Wall, **विस्तार**—Length.

उच्छ्राय—Height, **कोष्ठ**—room.

Height of the wall = $1\frac{1}{6}$ of the length.

Width of the wall = $\frac{1}{6}$ of the interior of the room.

[5] **भूमि**—floor.

[6] The difficulties arising from having these things just in the front of a door may be easily imagined.

[1]468-9. *The floor of the room is to be made one-fourth of the height. But others say that in the cases of palaces and temples it should be one-half.*

470. The window also must not be obstructed by another man's window.

[2]471-2. The roof made of tiles is to be high in the middle to the extent of half of the length. So that water falling on it may go down easily.

473. The roof should not be weak or low, so also the floor of the room.

[3]474-75. The wall of the town is to be uniform in depth and should have its foundation to the extent of one-half of its height or one-third of its height and have its width one-half of its height.

[4]476. The wall must be made so high as not to be jumped across by robbers.

[5]477. The wall is to be always guarded by watchmen each for three hours and to be provided with guns.

[6]478-9. The wall should have many strong shrubs and have a system of well-built windows, and if a hill is not hard by, should have a *pratiprâkâra* or a second wall but less than itself in height.

480-1 Thence the ditch is to be constructed, having its width double the depth, not very near the rampart, and having plenty of water.

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[1] **गृहपीठ** floor.

Sukrâchâryya's civil engineering :

Floor = $\frac{1}{4}$ the height of ordinary rooms.

= $\frac{1}{2}$ the height of palaces and *mandapas.*

[2] **छाद.**—roof. **खर्पर**—tiles.

मध्योच्चा—High in the middle. The conical shape of a tiled roof is well known.

[3] **प्राकार**- A technical term for the wall of a city or a fort not the walls of ordinary rooms or buildings.

मूल Foundation depth, **समूलक** uniform in depth **प्रविस्तार** width or breadth.

The following is the measurement suggested : Depth of foundation = $\frac{1}{2}$ the height, or $\frac{1}{3}$ the height.

Width of wall = $\frac{1}{2}$ the height.

[4] The height of the wall has reference to the activities of dacoits, a practical suggestion.

[5] **नालिकास्त्र**—Guns.

[6] All these are conditions for strengthening the wall.

प्रणाली—system or row. Windows through which the outside could be observed and missiles thrown without much injury to the life and property from the weapons of the enemies.

प्रतिप्राकार—The erection of a second wall but less high **स्वहीन** is necessary where the main wall has not the advantage of protection by a hill.

[1]482-3. It is not good for a king to live in a fort unattended by men who are proficient in the art of warfare and unprovided with the secret instruments and preparations. Such a life (*i.e.*, without military men and provisions) is for capture (of the king).

484-5. The Council House is to be constructed by the king beautiful and strong and divided into three, five or seven rooms.

[2]486-8. The northern and southern sides are to be long, twice or thrice the eastern and western sides according to liking and the house may be built with one floor or two floors or three floors, and having tents as houses on the top.

489. The Council House is to have windows in each room on all sides.

[3]490. The width of the central room is to be double that of the side rooms.

491-2. The height of the hall is to be one-fifth more than its width or is to be equal to it.

493(?). The floor as well as roof of the rooms are also to be constructed.

494. The two side rooms have each two floors but the central (*i.e.*, the hall) is to be of one floor.

495. The Council House is to be a beautiful edifice having good rooms within separate pillars and accessible by all routes.

[4]496-8. The Council House is to be furnished with instruments for throwing water upwards, musical instruments, instruments for distributing air and also for indicating time, mirrors as well as pictures.

499. Such a Council House is for the deliberations of proposals and consideration of problems.

500-1. Dwelling Houses for ministers, clerks, members of Council and officers should be built separately to the north or east.

502-3. Leaving a space of 100 cubits towards the north and 200 cubits towards the east of the palace, military cantonments are to be laid out.

504-5. The wise king should provide for the houses of the people in order of wealth and birth near his palace in all directions.

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[1] सम्भार—provisions, necessary preparations.

[2] उपकार्य्या Tents.

[3] The Hall is to have twice the space of the other rooms.

[4] Pumps, fans and clocks are referred to here.

[1]506-12. The following are to be stationed in the order indicated below: first the lower officers and servants, then the commander, then the infantry, then the cavalry, then the men of horse, men with elephants, attendants of elephants, then the guns and ordnances, then the mares, then the bodyguards and aid-de-camps, then the foresters.

513. Then the *serais* or rest-houses for travellers are to be built strong and provided with tanks.

514-5. The rooms of the rest-houses are to be uniform and in a row, and may face the north or east.

[2]516. In the market place, stalls or shops are to be placed according to the classes of commodities.

517(?). On both sides of the road houses to be arranged according to the wealth of the inhabitants.

[3]518. In this way the king should plan both the town and the *grâma.*

519. *Râjamârgas* are to be constructed from the palace in all directions.

520. The best *Râjamârga* should be thirty cubits wide, the average twenty cubits and the worst fifteen cubits only.

522. These *Râjamârgas* are both in towns and villages and used for the conveyance of marketable commodities.

523. The *padya* or footpath is three cubits wide, the *beethi* is 5 cubits and the *mârga* is 10 cubits whether in town or village.

525. These ways (*i.e.*, the *padya, beethi* and *mârga*) should emanate from the centre of the *grâma* towards the east, west, north and south.

526(?). The king should lay out many roads according to the number of towns.

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[1] **सादी**—cavalry, **स्वगौल्मिक** personal guards.

[2] **सजाति** of the same class, uniform, **आपण** market place, **पण्यवेशनं** stall for commodities, **निवह** mass, multitude.

[3] **पत्तन** Town.

Beginning with the capital the author has described the palace, the council, the dwelling houses of soldiers, officers and the people generally, the *serais* for travellers with many etails as to their sites, measurements and internal arrangements. The whole gives a very vivid picture of the socio-economic aspects of town and country life among the ancient Hindus. To make the picture complete, Śukrâchâryya now proceeds to describe the roads and the means of communication generally.

[1]527. But he should not construct either a *beethi* or a *padya* in the capital.

528-9. In a forest of six *yojanas* (*i.e.*, forty-eight miles) the best *Râjamârga* is to be constructed ; in the middle, the average, and between the two, the worst ?

530. In each *grâma* there should be roads of 10 cubits.

531. The roads are to be made like the back of a tortoise (*i.e.*, high in the middle) and provided with bridges.

[2]532. And the road should be provided with drains on both sides for the passage of water.

533-4. All houses must have their faces (*i.e.*, doors) on the *Râjamârga* ; and at their backs there should be *beethis* and places for committing nuisance.

535. The houses should be arranged in two rows.

[3]536-7. The king should have the roads repaired every year with gravels by men who have been sued against or imprisoned.

538-9. Between every two *grâmas* a *serai* is to be built. It is to be daily cleared and well-governed by the rulers of *grâmas*.

540. The master of the *serai* is to ask the following question of the travellers coming to it :

[4]541-3. Whence are you coming and why ? Whither are you going? Speak truly. Are you or are you not with attendants? Have you any arms in your possession and have you any conveyances with you ? What is your caste ? What are your family and name ? Where is your permanent residence ?

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[1] Thus *grâmas* may have—' (1) *Padya*, (2) *Beethi*, (3) *Mârga*, (4) *Râjamârga*.
Capitals, cities and towns may have—(1) *Râjamârga*, (2) *Mârga*.
Definitions : *Râjamârga*—(i) 30 cubits wide
(ii) 20 cubits „
(iii) 15 cubits „
Mârga—10 cubits „
Beethi— 5 cubits „
Padya— 3 cubits „

[2] The characteristics of roads are highly scientific.

[3] This account of the spacious roads and principles of their construction indicates a high standard of hygienic perfection and regard for the comforts and conveniences of life. These descriptions of the town, dwelling-houses, roads, &c., are sufficient evidences to prove that the ancient Hindus were not transcendental philosophers solely but knew how to enjoy life and use their intelligence to make it worth living and that material civilisation was not less highly developed than spiritual.

[4] Some of these questions may have some political significance besides being mere queries to know details about the travellers. Undesirable persons may thus be arrested,

[1]544-5. *Asking these questions the master of the rest-house should* note them down and in the evening having taken away the traveller's arms should advise him "Take sleep carefully."

546-7. Having counted the number of men in the house and shut its gate, he should have it watched by the guards working for three hours each, and awaken the men in the morning.

[2]548-9. He should give back the arms, count the men and then let them off by opening the gate and accompany them up to the boundary line.

550. The king living in the capital city should discharge his daily duties.

551-4. Having got up in the last *yâma* he should for two *muhûrtas* study the following points:—How much is the fixed income and how much the certain expenditure? How much has been used out of the things and materials in the Treasury? What is the remainder after the transactions from the fixed Income and Expenditure?

555-6. Then ascertaining from the record as well as by personal knowledge as to the amount expected to be spent to-day he should bring the articles out of the Treasury.

557. Then for one *muhûrta* the clearing of bowels and bathing are prescribed.

558-9. He should take two *muhûrtas* in prayers, study and charity, and one *muhûrta* at dawn in exercises over elephants, horses and carriages.

560. He should pass one *muhûrta* in giving away prizes.

The fact that there should be such rest-houses between the *grâmas* is itself an indication of the considerable development of social life and the high sense of duty towards strangers and guests. And the nature of the queries as well as the principles of administration of these *serais* leave no doubt as to the organising capacity and administrative ability of the ancient Hindus. Even if such complex regulations for their administration are considered to be the products of the philosopher's brain he must be credited with a good amount of political wisdom and a sound knowledge of the art of good and strong government.

[1] The record kept by the शालाधिप would thus be a very good statistics of information about merchants, merchandise, hermits, tourists, strangers, guests, their permanent addresses, position in society and the mission of their journeys. These registers might be valuable materials for the construction of a history of some of the most vital aspects of Indian socio-political life.

[2] The account is rather incomplete because nothing is mentioned about the meals the travellers take during the night. As described above, the rest-houses are meant to be used only during the night and seem to be more like police stations than anything else. The whole method of superintendence and administration points emphatically to this.

561-2. He should spend four *muhûrtas* over writing orders, together with estimates of income and expenditure about grains, clothes, gold, jewels, and soldiers.

563. He should peacefully take his meals with kith and kin for one *muhûrta.*

564. He should observe old and new things for one *muhûrta.*

565-6. Then he should spend two *muhûrtas* over matters explained by Chief Justices and officers; and the same period in hunting and gambling.

567-9. He should spend one *muhûrta* over the military exercises of the regiments, then one *muhûrta* in evening prayers, one *muhûrta* in dinner, two *muhûrtas* in hearing informations given by the secret spies, and eight *muhûrtas* in sleep.

570. Happiness increases to the king who works in this way.

[1]571-2. Dividing the day and night thus into thirty *muhûrtas* he should pass the time, but never waste it in enjoying women and drinking.

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[2]573-4. The work done at the time appointed for it is certain (to produce good results). Thus rains in time give rise to plenty, but otherwise are highly injurious.

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[1] 30 मुहूर्त =60 दण्ड =24 hours.

The following is the king's time-table and routine of daily work :—

2 *Muhurtas*—Studying the Budget.
1 „ —Lavatory and Bath.
2 „ —Religious performances.
1 „ —Exercises, physical.
1 „ —Distribution of prizes.
4 „ —Business with the chief of granaries.
1 „ —Dinner and rest.
1 „ —Study of old and new.
2 „ —Consultation with Justices.
2 „ —Hunting, &c.
1 „ —Parade of troops.
1 „ —Evening Services.
1 „ —Supper.
2 „ —Business with spies.
8 „ —Sleep.

30 *Muhûrtas.*

[2] **A commonplace lesson on the advantages of keeping to time, illustrated by an analogy with one of the most characteristic physical and economic features of India.**

[1]575-7. The king adept in the use of kind words and proficient in the rules of morality and etiquette should have the offices of work guarded on all sides and without cease by four, five or six excellent watchmen well trained in the use of arms and weapons.

578. The daily affairs of those places he should hear through the head clerks (chief officers).

579. He should rotate the watchmen every day.

[2]580. The out-post should be built by the police at the mouth or end of the line of houses.

[3]581. The king should hear reports of their work from them who are to be maintained by wages raised from the householders.

[4]582-3. The sentinel should carefully examine those who go out of the *grâma* and those who come into it and let them out after they have paid some security.

[5]584. But those who are of known, *i.e.*, illustrious deeds and character he should allow without consideration.

[6]585-6. For the prevention of thieves and bad characters the watchmen should at night visit the *beethis* every half *yâma* (*i.e.*, hour and a half).

[7]587. The following laws are to be always promulgated by the king among his subjects :

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[1] अभितः on all sides, अनिशं having no night or end, *i.e.*, permanently. नति bending, bowing, etiquette, &c.

[2] द्वार Police stations, out-posts of sentinels.

[3] The police is to be paid out of taxes collected from the people for whom it has been stationed. An application of the principle of local taxation for local purposes.

[4] लग्नक Security. The administration of the village police as well as the superintendence of rest-houses for travellers indicate the vast and intricate system of public espionage that was in force. Besides, there was the Secret Service Department.

[5] Searching inquiries about strangers and ordinary men necessary. But men of name and fame should not be made to submit to this Criminal Investigation. There was thus room for judicious discretion.

[6] पर्य्यटन Rounds of the sentinels.

[7] Having described the village police the author is going to give an account of some of the social, moral, sumptuary and other laws that the king should pass for the guidance of his subjects.

[1]588-9. Towards the slaves and servants, towards the wife and children or towards the disciple no one obeying my command should be harsh and cruel in words.

[2]590-2. ? Falsehoods must not be practised by anyone with regard to the system and standard of weights and measurements, currency, extracts, some kinds of metals, ghee, honey, milk, fat, oil, ground substances and other things.

[3]593. Nor must writings (or statements) be forced, bribes be accepted, or the interests of the master consciously damaged.

[4]595-6. You should never keep screened, *i.e.*, give protection to, men of wicked activities, thieves, bad characters, malicious and offensive persons, as well as other wrong-doers.

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[1] This is a law enjoining kind treatment of inferiors by superiors, *e.g.*, the employees by the employer, the servant by the master, the wife by the husband, the sons by the father, and the pupils by the Guru. Three classes of social and domestic relations are mentioned here :—(1) Service, (2) The Family, (3) The School. And as in each case the head is a single individual like the patriarch and likely to be tyrannical, the importance of kind words and gentle treatment cannot be overestimated. These, however, are not left to the individual's own sense of humanity and justice. The State itself, according to Śukrâchâryya, should issue definite decrees.

मद्देशसंस्थितैः By those who live under my jurisdiction or commands.

[2] तुला Weights and measures. शासन system, मान standard, नाणक coins, वसा fats, कूट falsehood, deceit, *e.g.*, adulteration in some cases, counterfeiting in others.

Śukrâchâryya's comprehensive view grasps almost all the economic transactions which are liable to the practice of dishonesty and deceit, and which it has been the function of the Society and the State to guard against on hygienic, economic, moral and political grounds in all times and ages.

Here, again, as in the above cases of social and domestic relations, Śukrâchâryya does not advocate the policy of *Laissez faire*. The State should come forward and intervene and protect the society from the dangers of food adulteration, false and counterfeit coins, unscientific medicinal extracts and other preparations as well as the passing off of base metals for genuine and high class things. The following are the five classes of commodities regarding which such crimes are likely to be perpetrated : –

(1) Weights and measures (2) Coins (3) Medicines (4) Metals (5) Food substances.

[3] These are more or less administrative and political regulations different from the above which are mainly of social and economic nature.

स्वामिकार्यविलोभन Just as the master has been ordered to be kind and lenient towards his employees, so the employees are here commanded not to forget or wilfully damage and consciously injure the interests of their masters.

[4] अप्रकाश hidden, screened. It is the duty of the people not only not to commit these wrongs, but also to hand over to the police, or otherwise disclose to the State the existence of the men who are in any way undesirable to the society and the kingdom. The whole society is thus enjoined to be an active information-and-vigilance-committee and an association for public safety.

[1] 597-8. Insult and jokes should never be dealt out towards the *parents and other respectable seniors, as well as towards the men of learning and virtuous character.*

[2] 599-600. *Discord must never be created between husband and wife, master and servant, brother and brother, preceptor and pupil, as well as between father and sons.*

[3] 601-2. You must never obstruct the tanks, wells, parks, boundaries or place hindrances to the use of religious houses, temples and roads, nor must you check (the movements of) the poor, the blind and the deformed.

[4] 603-8. Without the permission of the king the following things are not to be done by the subjects:—gambling, drinking, hunting, use

Here, as in other injunctions, Śukrâchâryya displays the highest political wisdom and the keenest insight into the principles of strong and good government. All these are based on the principle that the security of the State depends not on the passive virtue of obedience to the laws promulgated by it but on the active co-operation of the people with it in carrying these laws into effect. Śukrâchâryya's political system has many points which have anticipated the latest principles of good administration and which have yet to be realised by modern States.

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[1] These are rules regulating conduct towards superiors in age, intelligence and character, and supplement those discussed above regarding the treatment of inferiors by superiors. The king, according to Śukranîti, has to enjoin the duties of the son, the disciples and the people generally, because as the head of the State he is also the head of the society and hence the guardian of religion and morality—a principle recognised in all monarchies.

[2] This is a further law of the State regarding social and moral interests of the people. The greatest of all dangers to social peace and political security is the existence of conflicts, disunions, rivalry and party spirit. The bond of civil society is torn asunder when the moral relations are disturbed. Hence the greatest political offender and the most criminal sinner is he who by his conduct promotes the breach between those who should normally live in amity and peace. And Śukranîti provides against such offences by the socio-political decree issued by the king.

[3] This is a law preventing undue use or abuse of the public places and other works of public utility, and as such indicates, in the first place, the highly complex administrative organisation to be followed by the king, and secondly, the vast number of such temples and parks, wells and roads scattered throughout the kingdom that *necessitated the passing of a separate law or at any rate their consideration as an important item of the public interests of the State. The rule regarding the disabled and* the unfortunates is purely humanitarian.

[4] Here is a mention of all those practices and professions which for public safety, social peace and future interests of the parties concerned should be endorsed by the State, and receive a royal patent, charter or license to testify to their *bona fide* character. In all these cases the State, according to Śukranîti, must interfere even on the principle of "individualistic minimum." However highly philosophers and theorists might praise the principles of let-alone and non-intervention in social affairs, statesmen and pillars of States have uniformly adopted in practice the principles of socialistic

of arms, sales and purchases of cows, elephants, horses, camels, buffaloes, men, immovable property, silver, gold, jewels, intoxicants and poisons, distillation of wines, the drawing up of deeds indicating a sale, gift, or loan, and medical practice.

[1] 609-12. Nor should you ever do the following things:—Serious cursing, acceptance of pledges, promulgation of new social rules, defamation of castes, receipt of unowned and lost goods, disclosure of State secrets, and discussion about the king's demerits.

[2] 613-6. So also you must never even in mind commit the following actions:—Forsaking your own religion, untruth, adultery, perjury, forgery,

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interference, and been compelled to enlarge the functions of their States even against their own abstract conceptions. The hoary Śukrâchâryya and the modern Sidgwick are here on a common ground.

द्यूतं—Gambling, all those plays on which money wagers are staked. Interests of public safety require that there should be a limit to these practices. Hence the necessity of royal licenses.

मद्यपानं—Drinking is also to be controlled by some such law as penalises the purchase or possession of more than a fixed quantity. मद्यसंसाधन—preparation of wines in breweries and distilleries has also to be licensed.

मृगया—There are Game Laws in every civilised State. The preservation of games and the preservation of forests have become in these days the accepted principles of scientific administration. Hence sportsmen must carry licenses.

क्रय—These deeds must receive royal sanction, for the agreements or contracts might contain some inhuman or immoral or illegal items, and hence have to be registered in order that they may be valid.

चिकित्सं—Licences to medical practitioners and druggists and chemists.

In reading an account of these laws one seems to be skipping over the pages of the penal and criminal codes of modern States. These and other regulations point to the remarkably analytical study of legal and juristic problems and the highly developed system of jurisprudence.

शस्त्रधारणं—Unlicensed arming is prohibited.

The following are the classes of licensable affairs:—

(1) Gambling, (2) Drinking, (3) Distillation, (4) Sports, (5) Arming, (6) Trade in—(*a*) Cattle, (*b*) Men, (*c*) Land, (*d*) Metals, (*e*) Spirituous liquors, (*f*) Poisons, (7) Deeds of contracts regarding—(*a*) Sales, (*b*) Gifts, (*c*) Loans, (8) Medical Profession.

नृणां—Trade in men, sales and purchases of slaves are referred to as one of the licensable affairs.

[1] —The specially noteworthy rules in this somewhat miscellaneous regulation are about नवसमाजनियम or new social regulations, and जातिदूषणं or defamation of castes. It seems that no new custom or breach of the existing system was allowed to the people except through royal assent. And perhaps it was an offence to speak ill of the lower castes.

[2] —कूट False, अप्रकाश प्रतिग्रह Bribes (hidden receipts). These lines may be regarded as forming something like a Hindu Decalogue or the Ten Commandments of the Hindus:

(1) Thou must not forsake your own duty in life,
(2) Thou must not tell lies.

secret acceptance of gifts, realisation of more than the fixed revenue, thieving, violence and enterprise against the master.

[1] 617-18. You should never commit violence (or aggression) on anybody in the matter of remuneration, duties or revenues by increasing them through sleight or strength.

[2] 619. All measurements have been definitely fixed and ascertained by the king.

620. All the subjects should try to be qualified in the performance of meritorious actions.

621. When a violence has been committed the aggressor must be caught and handed over (to the State).

[3] 622. Those who have let out bulls and other animals (after religious observances) must keep them within proper control.

[4] 623-24. I will surely destroy by severe punishment those offenders who after hearing these my decrees would act contrary to them.

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(3) Thou must not commit adultery.
(4) Thou must not bear false witness.
(5) Thou must not forge.
(6) Thou must not accept bribes.
(7) Thou must not extort more than what is due unto you.
(8) Thou must not steal.
(9) Thou must not oppress (or commit violence).
(10) Thou must not rebel (or commit perfidy).

Śukranîti is as much a text-book of Ethics as of Political Science.

[1]—आधर्षणं, —aggression, शुल्क- duties, rates, taxes. This law prohibits exactions and undue enhancements of payments from the master in the shape of increased wages or salary, from the merchants in the shape of augmented excise and customs, and from the subjects in the shape of exorbitant revenues. Rates in all these cases must not be increased by threats of physical violence or by crafts of diplomacy.

[2] परिमाण—Standard of measurement for lands.
उन्मान—Unit of measurement for liquids.
मान—Unit of measurement for grains.
विमुद्रितं—Ascertained and fixed.

Realisations should be made in the above cases according to the fixed rates in the schedules published by the State.

[3] These animals must not be allowed to destroy public property or otherwise damage the peoples' interests.

This is a peculiar Hindu custom, *viz.*, the consecration (उत्सृष्ट) of bulls and other animals to the gods. But the State enjoins that those who would observe this socio-religious custom must be responsible for the movements of the animals in the interests of the society at large.

[4]—Here comes the legal sanction of the social, economic, moral and political duties enumerated above. A careful study of the functions of the State as suggested by the promulgation of these laws would lead to the conviction that the Hindus were not only a nation of dreamers and philosophers, but were practical men who understood their secular and temporal interests as keenly and knew how to protect and develop

[1] 625-6. The king should always inform the subjects of those laws by the State drum and also place them in esplanades as written notices.

627-8. To the wicked people as well as to the enemies the king should ever be ready with punishments. The subjects are to be protected by the king according to Nîti.

[2] 629-30. For the convenience of travellers the king should protect the roads. And those who are oppressors of travellers must be very carefully repressed.

[3] 631-5. The heads of the *grâmas* are to receive one-twelfth of the income from the *grâma*. The army is to be maintained by three

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them as wisely as any other nation that has contributed to the material civilisation of humanity. Comparing the political theories and practices among the Hindus with those obtaining among other nations that have risen to the height of political consciousness and have in any considerable degree wielded the machinery called the State, one is forced to hold that, after all, the test of political wisdom and statesmanship is in the capacity to promote the interests of man and devise ways and means for their furtherance, that there is great truth in the couplet—

> " For forms of government let fools contest
> Whatever is best administered is best."

It is an error to suppose that the Hindus were a " pre-political " and " pre-economic" people or even that they were an essentially non-political or non-economic race. Political insight, the study of public interests, solicitations for material prosperity and discussions about the common weal must have been integral features of Hindu national life in order that it might evolve such conceptions of order and notions of political organisation as we have been describing here.

[1] In order to prevent the possibility of the pleading of ignorance of laws the greatest publicity has to be given to them. Two means are suggested—(1) The beating of the State drum to announce the royal orders and (2) The Proclamations written down and stuck as posters in public places such as squares, the crossings of streets, &c.

[2] Roads must always be maintained in good condition and free from the aggression of robbers and cheats. The purpose is also mentioned—**पान्थसुखाय** *i.e.*, for the convenience of travellers and passengers.

[3] Six divisions of the annual expenditure are here suggested. The appropriations of the income to several purposes are to be in the following proportion :—

Grâmapa	...	$\frac{1}{12}$	of the income.
Army	...	$\frac{3}{12}$	"
Charity	...	$\frac{1}{24}$	"
People	...	$\frac{1}{24}$	"
Officers	...	$\frac{1}{24}$	"
Personal	...	$\frac{1}{24}$	"
Six items of expenditure	...	$\frac{12}{24}$	or $\frac{1}{2}$ of the income.

The annual deposit of the surplus is therefore to be $\frac{1}{2}$ of the income.

(such parts), charity (to be done to the extent of) half (of such a part), the people are to be entertained) with half (of such a part), the officers (are to be paid) with half (of such a part), personal expenditure (to be met) out of half (of such a part). And the treasury is to be saved by the remainder. By dividing the income into six such divisions the king should yearly incur expenditure.

636. This rule is meant for and should be observed by rulers like *Sâmanta* and above, not by inferiors.

637-8. There should be no inactivity in the preservation of acquired kingdoms, fame, celebrity, wealth and qualifications, and also in winning these from others.

[1] 639-41. One should always be very mindful about acquisition and preservation, and never abandon heroism, scholarship, plain speaking, and philanthropy. The king (should be mindful) about strength, prowess and daily preparation for war.

642-3. That man is a *Śûra* who, giving up fear for his own life, can securely fight in battles for his own interest or for the cause of his master.

[2] 644-5. That man is a *Paṇḍit* who can accept without partiality even the well spoken words of a child, and practises the truths of religion.

[3] 646-7. The man who even in the presence of a king can fearlessly speak out his demerits and never praises them like merits is the real speaker.

648-9. The man to whom there is nothing to be kept back from gift, *e.g.*, wife, son and wealth, who can give away even his life to the proper person is called a *Dâtâ* or giver.

650. That is called *Bala* or strength by which a work can be done without anxiety.

651. *Parâkrama* or prowess is that through which other princes appear to be mere *kinkaras* or obedient servants.

[4] 652. *Utthâna* is known to be the preparation for warfare.

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[1] Each of these qualifications is explained below.

[2] Two conditions make a *Paṇḍit* : (1) intellectual. He must be honest and unprejudiced enough to discuss with anybody and accept logical truths wherever received, (2) Moral. He must be a man of virtuous deeds.

[3] **वक्तृता** Not oratory, or elocution, but plain and honest speaking of the truths. Thus not an intellectual but a moral qualification is expressed by the word as used in the treatise.

[4] **उत्थान** A technical term for what is known as mobilisation or state of military readiness in view of an imminent war.

[1] 653. For fear of poisons the King should examine his food through monkeys and cocks.

654-57. At the very sight of poisoned food drakes limp (*i.e.*, cannot walk), bees hum, peacocks dance, cocks cry, cranes get intoxicated, monkeys pass stools, rats become excited, birds (*Maina*) vomit. Thus the food is to be examined.

[2] 658-59. He should take meals, having six, not simply two or three, tastes, not tasteless, nor over-tasteful, not pungent, not excessively sweet or acid.

660. He should hear with the ministers the petitions and appeals of the people.

661-62. In parks (and places of entertainment) he should carefully indulge in enjoyments with the people, women, actors, musicians, poets and magicians.

[3] 663-64. He should every morning and evening exercise himself with elephants, horses, chariots and other conveyances. And he should learn as well as teach the military arrangements of soldiers.

665-66. He should sport with tigers, peacocks, birds and other animals of the forest and in the course of the hunting should kill the wild ones.

[4] 667-69. The advantages of hunting are the growth of ability to strike the aim, fearlessness, and agility in the use of arms and weapons, but cruelty is the great defect.

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[1] From the very great precaution advised against indiscriminate use of food it would appear that poisoning of foods meant for kings or members of the royal family and of men of wealth and position generally was one of the prominent social evils of the times. For this we have an analogy in the Italian society of the Fifteenth Century.

In the next lines the author is describing the process of testing the food and the indications by which its purity is to be determined by narrating the effects of poison upon some of the domestic animals.

[2] A mixed diet is recommended. There must be no preponderance of any one taste.

षड्रस The six flavours or tastes are sweet, salt, pungent, bitter, sour and astringent.

[3] Military exploit and other physical exercises are described here. The king must never be without military training.

व्यूह Array of soldiers, formation of groups.

[4] लक्ष्यसन्धानसाधनं Which is instrumental (साधन) in striking or hiting (सन्धान) the objective or aim (लक्ष्य).

In a previous part these military and manly exercises were mentioned as two important items of the daily routine of work. The author is here explaining his reason for making them an integral part of the king's life.

[1] 670-73. He should every night hear from the secret spies and informers the opinions, sentiments and demonstrations of the subjects and officers, the Departments of administration, enemies, soldiers, members, relatives, and the females of the inner apartments.

674. He should do that carefully and well equipped with arms and weapons note down (the statements of the spies).

675-76. The king who does not punish the false-speaking spy becomes the destroyer of the people's persons and properties and is called *Mlechcha.*

[2] 677-78. The king should examine the spy (and test his efficiency) either directly or by some art after he has assumed the garb of a religious student, of one practising penance, a hermit, lower class men or a magician.

679-80. If the king accepts a spy without testing him in the above way, he can get no information and has to repent. And the spy also does not fear to speak untruth to a king who does not examine him.

[3] 681. He should protect the spy from both officers and the departments of administration.

[4] 682-83. There should ever be only one leader in a State, never many. And the king should never try to leave any situation without a leader.

[5] 684-85. If in the king's family there be many males, the eldest among them is to be king, the others are to be his assistants and auxiliaries.

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[1] इङ्गित Sentiment. चेष्टितं Activities, demonstrations, manifestations.

मतं Opinions, approved measures.

अधिकारिणां Of men appointed as officers, प्रकृतीनां The Departments of State.

[2] वर्णी Religious student. सिद्ध Magician.

[3] *The following are the rules about the administration of espionage* :—

(1) **The king should hear from the spies at night.**

(2) **He should be well-protected while in their presence.**

(3) **He should examine them, before appointment, as to their capacity and honesty.**

(4) **He should punish them when dishonest but carefully protect them during their period of work.**

[4] **This is a general principle about all kingdoms. Evils of many leaders were not unknown.**

'No leaders' would mean anarchy. So the rule of One is the only normal form according to Śukranîti. Śukrâchâryya's system does not recognise a form of government in which sovereignty rests with the Many.

[5] **According to the principle of the rule of One the law of primogeniture must obtain in the matter of succession to the crown.**

(?)686. More than all other assistants these members of the aristocracy help forward the interests of the State.

687-88. If the eldest, however, is deaf, leprous, dumb, blind or eunuch he will not be eligible for the throne, the king's brother, or the eldest son's son (will be eligible).

689. And the eldest son's junior (*i.e.*, the king's second son) or the son of the king's brother will get the throne.

690. In the absence of seniors the juniors are heirs to the throne.

[1]691-92. Unity of opinion among the heirs (or sharers) is good for the king. Differences among them are dangerous to both the State and the family.

[2] 693-94. Hence the king should arrange for these heirs the same kind of comforts and enjoyments as for himself, and should be strict in command (to the servants) in satisfying them with umbrellas and thrones.

[3] 695-96. By the partition of kingdoms there can arise no good. Rather, the kingdom divided into parts is exposed to the enemies.

[4]697-98. He should station them in various quarters by paying them one-fourth of the royal revenues or make them governors of provinces.

699. He may appoint them as the heads of cows, elephants, horses, camels, treasure, &c.

700. The mother and the lady who is of the same rank as the mother should be appointed in charge of the kitchen.

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[1] दायाद Receivers of shares, heirs.

The conflict between possible heirs is the great defect of all conditions where hereditary monarchy prevails, and the difficulty is felt both in kingdoms as well as duchies or non-regal jurisdictions. Partition suits, civil wars, quarrels between sons, nephews and uncles intensified by rivalries between ministers, pretender's claims are the natural phenomena where possessions come down on the domestic system. Hence the danger both to the territory as well as the family. Both are involved in the common ruin.

[2] The possible heirs who in their self-interest cannot but look upon the existing king as well as his direct successor as rivals and natural enemies and who would gain rather than lose anything in their deaths, must be maintained in the right royal style so that they may not take umbrage at any carelessness on the part of officers of the royal household.

[3] जिघृक्षति Wants to seize or capture.

This, again, is a sound advice. In politics, as in other affairs, union is strength and disunion is fall. The evil of small kingdoms has been sufficiently indicated in these lines regarding leaders, and succession.

[4] The members of the royal family who may legally hope to get throne in default of heirs, should be pacified by the grant of pensions or appointment as officers under the State, *e.g.*, chiefs and governors of the districts. Something like a Feudal system is thus to be introduced by establishing a hierarchy of officials from among the members of the royal blood,

[1] 701. Cognate kinsmen and brothers-in-law are to be ever appointed in the Military Department.

702. Critics of one's own faults are to be made those who are superiors and friends.

703-4. The females are to be appointed in the overseeing of clothes, ornaments and vessels.

But he himself must reflect upon and seal all in succession.

[2] 705-6. He should consult with ministers on future actions in some secret place, *e.g.*, the inner apartments of the house, cleared forests, by day or by night.

707-8. He should discuss royal duties with friends, brothers, sons, relatives, commanders and members in the Council House.

[3] 709-10. In the centre of the western half of the meeting the royal throne is to be placed. The bodyguard and retinue are to sit by his right and left.

[4] 711-12. The sons, sons' sons, brothers, nephews, daughters' sons are to sit at his back in succession, proceeding from the right towards the left.

[5] 713-14. Uncles, superiors of the same family, members and commanders are to sit in the front on separate seats at the right hand moving towards the east.

[6] 715-16. Superiors in the family of maternal grandfather, ministers, cognate relations, fathers-in-law, brothers-in-law, and officers are to sit in the front at the left hand (moving towards the east).

717-18. The son-in-law and brother-in-law are to sit just on the left and right sides. And the friend is to be like him, either near or on half of his own seat.

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[1] **बान्धव "A distant or cognate kinsman, and subsequent in right of inheritance to the gentile or *sagotra*; the *bandhu* is of three kinds—**

(1) The kinsman of the person himself,

(2) The kinsman of the person's father, as his father's brother's son,

(3) The kinsman of the person's mother, as his mother's sister's or brother's son; and the same reckoning upwards, *e.g.*, his father's father's sister's son."--Wilson.

[2] **वेश्म** Room.

[3] **कोष्ठ "Any viscus, as the heart, lungs, stomach, bowels."—Wilson. It may thus mean a part of the body, a side. So पार्श्व and कोष्ठ refer almost to the same thing. And those who go by पार्श्व and कोष्ठ of the king may thus be roughly described as *Aid-de-camps, Bodyguards*, Attachés or *Retinue*, &c.**

[4] **Thus the sons are to take the seats on extreme right wing and the daughter's sons those on the extreme left wing of the back.**

[5] ***These persons are to sit before him in a row proceeding from the west to the east on his right-hand side.***

[6] **This is also likely to be a row proceeding from the west to the east. The two rows would thus face each other.**

719. In the place of daughter's sons and nephews the adopted sons may be seated, and nephews and daughters' sons may have seats of the sons.

720. The *Âchâryya* or preceptor, like the father, is to sit on the same kind of good seats.

(?)720. On both sides and in the front the scribes and clerks are to be at the back of the ministers.

721. The servants are to be seated at the back of all.

722. Two men bearing gold sceptres are to be on one side to communicate the presence and salutation (of persons) to the king.

[1] 725-27. The king should enter upon the throne provided with his special signs, well-dressed, well-decorated, armoured, with the crown on, with effective missiles and uncovered weapons, and very careful.

[2] 728-29. "Thou art the greatest of all *Dâtâs* (charitable men) and *Śûras* (heroes)"—such remarks he should not hear. Those who speak in this way are deceitful men.

[3] 730-31. The ministers are likely to be dumb (*i.e.*, silent) through the passions, cupidity and fear of the king. The king should not consider them friends for his own interest.

[4] 732-33. The king should receive in written form the opinions of each separately with all his arguments, compare them with his own opinion and then do what is accepted by the many.

[5] 734-35. The wise king should every day examine the elephants, horses, chariots, cattle, servants, officers, provisions, and soldiers, and preserve or maintain the able and give up the very old.

[6] 736. He should bring in one day news of places hundred *crośas* distant.

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[1] अस्त्र arms which have to be thrown, missiles. सिद्ध Unerring, effective.

[2] This is a precaution against flattery and the temptation to hear praises.

[3] With regard to the minister, the king should not act upon the principle "Silence gives consent," for there may be due motives for their silence.

[4] The king must have his own opinion on the top; then the individual opinions of the ministers with their reasons he will invite in a written form. The final decision will rest with him. The principle of acceptance is supplied by the rule of majority.

[5] The king is always to have in his service competent and able-bodied men and animals, as well as effective and useful materials (सम्भार). Hence the necessity of daily examination.

[6] Conveyance of news is a great part of political life and the king is advised to have a swift Postal Service. *The Post must be quick enough to carry the news of two* hundred miles in the course of one day. If such arrangements could be practically made one of the most important means of modern administration must have been secured.

[1] 737(?)-39. He should train the officers appointed with salaries in the cultivation of all the arts, and having seen that they have finished their studies, should appoint them in their special fields.

[2] 740. He should also honour those every year who are very high in arts and sciences.

[3] 741. The king should always take such steps as may advance the arts and sciences of the country.

742-43. The king should engage near him the services of the soldiers who are to precede and follow him, gaudily dressed, adept in the rules of etiquette and morality and supplied with useful missiles and naked weapons.

[4] 744. The king should tour the city on the back of elephants in order to please the people.

[5] 745-46. Does not even the dog look like a king when it has ascended a royal conveyance? Is not the king justly looked upon as a dog by the poets?

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[1] This is the special arrangement for the training of officers.

भृतिपोषितान् Scholarship-holders and stipendiaries. In this case the two lines would imply that the king should maintain students with scholarships for the study of the various branches of learning, and when they have been sufficiently educated, should appoint them to proper posts in the Government service. The lines would then refer to the general system of education financed by the State, and the method of giving employments in the State to learned scholars.

[2] Does it refer to the system of annual examinations or recognitions of merit and the awarding of titles, diplomas, prizes to the alumni every year?

[3] Encouragement of education, spread of learning and the development of arts and sciences are regarded as some of the functions of the king. Śukrâchâryya while enumerating the so many social, moral and economic functions in addition to the ordinary political and administrative functions of the State, does not forget the educational activities of what has been called the *Cultur-Staat*.

[4] This, however, is the very means of taking away from the people's minds the notion of "the divinity that hedges the king." *Advocates of monarchy* generally make a political application of the precept 'Familiarity breeds contempt' by keeping the king as much away from the peoples' gaze and scrutiny as possible and thus shrouding him with transcendental halo and endowing the royal position and affairs with a mystic grandeur. It is one of the many peculiar paradoxes of Hindu sociology that the king who is a god in human form is yet by personal contact and other ways brought within the field of public criticism in such a way as in other countries has led to the gradual devolution of his influence and functions on the Many and the establishment of a Democracy, or at any rate, the Aristocracy.

[5] The king does not look magnificent unless he is attended by the retinue of officers and the regal insignia as well as the paraphernalia. The king alone is no more than a dog, *i.e.*, cannot command awe and reverence of the people.

[1] 747-48. Hence he should be accompanied by his kinsmen, friends, and the State officers who have been made equal to him through qualifications, never by the low class people.

749. The *neecha* or wicked and the *sâdhu* and honest are respectively the men whose practices are false and evil, and good.

[2] 750. The wicked people display greater gentleness than the *sâdhus*.

[3] 751-52. The king must personally inspect every year the *grâmas*, *puras* or cities, and *desas* or districts and provinces and must know which subjects have been pleased and which oppressed by the staff of officers, and deliberate upon the matters brought forward by the people.

[4] 754. He should take the side not of his officers but of the subjects.

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[1] **स्व साम्यप्रापितैः गुणैः** by those who have been made to attain **प्रापित:** equality **साम्य** with him by dint of qualifications, *i.e.*, meritorious and well-trained.

प्रकृति As a term in Hindu Political treatises means : (1) subjects, (2) the requisites or departments of **राष्ट्र** which have been mentioned previously to be seven in number, (3) officers, ministers, secretaries, &c.

[2] But the two are to be distinguished by applying the dictum 'All that glitters is not gold.'

[3] Among the many duties of the king, inspection and supervision, by tours through the kingdom, of the work of his officers as well as inquiry into the condition of the subjects have been given a prominent place. He must not be an irresponsible head, but the real controller of affairs and hence must personally study the affairs of the State.

ग्रामाण् पुराण् देशान् These three terms seem to describe the three principal units of territorial administration like the township, the city and the circle of modern States.

रंजित Satisfied, **कर्षित** tortured, displeased. The words point to the good or bad effects of administration. **तासां तु भतन व्यवहारं विचिन्तयन्** should discuss measures(**व्यवहार**) according to the matters or complaints or petitions (**भूत**)brought forward by the people. The king's tours must not be nominal. He must be prepared to solve some of the knotty points which may have been left untouched or decided unsatisfactorily or temporarily by the servants. The right of direct petition by the subjects is here, as in other places, definitely recognised.

A monarchy, however divine and absolute in theory, supplies, so far as these and other conditions are mentioned, practically all the advantages of self-rule and government by the Many. The most rigid enforcement of obligations and duties from, side by side with the most lavish grant of rights and privileges to, both the governor and the governed explain the seeming inconsistency and paradox that characterise the Hindu political system, and the great discrepancy between the theoretically despotic and the practically democratic features of the political organisation.

[4] This is a sound political maxim and is based on the observation of the fact that the peoples' interests and opinions do in most cases differ from the report and opinions of the servants of the State. Hence in cases of conflict between the two, the king should take the peoples' point of view.

Happiness of the people is the sole consideration to a king. Hence his interests must ever be identified with those of the people. And in deciding upon measures he should be guided by the truth '*vox populi vox deii.*' Thus though the king is himself a god, the god of the king is the people. And, in fact, the king has been described as their

[1] 755. He should dismiss the officer who is accused by one hundred men.

[2] 756-57. He should privately punish the minister when he is found to have gone astray more than once and dismiss him who by nature commits offences.

[3] 758. Of the rulers who do not act according to Nîti the king should take away both the kingdom as well as all property.

[4] 759. Courts should always be established in the territories of conquered rulers.

[5] 760. He should give pensions to the conquered rulers according to their character.

761-62. He should have as his bedmate a woman who is devoted to him, beautiful, sweet in speech, well-dressed, well-adorned and well purified.

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servant getting remuneration for his work in ll. 375-6, where the peculiar dualism and antithesis in the king's position have been very unhesitatingly indicated.

The combination of sacrifice with enjoyment, the harmonising of *sanyása* and asceticism with *Samsâra* and attachments, the intermixture of *Nivritti* or highest spiritual self-realisation with *Pravritti* or pursuit of pleasure in life, the perception of the Infinite in the Finite, and the leavening of duties with rights are, in fact, the permanent and essential features of that transcendental Positivism, that Idealism and Supernaturalism in the interests of the actual and natural, that sense of other worldliness for the practical good of this world and the happiness of man that characterise the national life and literature, and are embodied in the social institutions, of the Hindus. This eternal antithesis between the human and superhuman is the fundamental bedrock of Hindu Sociology and is never forgotten by poets in their description of ideal kings and great men. It is the basis of the division of Hindu life into the four stages of *Brahmacharyya*, *Gârhasthya*, *Vânaprastha* and *Yati*. The test and touchstone of true greatness among the Hindus are the approximation in life and thought, to such principles as are suggested by the phrases असक्तो सुखमन्वभूत् or 'he enjoyed happiness without attachment,' and कर्म्मण्येवाधिकारस्ते मा फलेषु कदाचन or 'thy right is only to the work, never to the fruits.'

[1] Is it something like Greek ostracism ? This is a sufficient check to the arbitrary or foolish actions of the royal servants. Verily, the voice of the people is the voice of the god.

[2] सकृत् many times. आगस् sin, offences, एकान्ते privately, not in public manner for otherwise people would have no confidence in the minister. As the minister occupies a very important and dignified post, the king should be very careful in scrutinising his affairs so as not to lower him in the estimation of the public.

[3] Confiscation of possessions when dependent rulers are proved to be incompetent, or conquest of territories when neighbouring kings are found to commit wrongs.

[4] The king must never lose time in following up a victory by establishing his offices, courts, palaces in the conquered kingdom विषय in order to make the people feel the fact of conquest and organise the administration of the province in his own way.

He must display his ability not only to acquire, but also to rule and protect.

[5] These lines prescribe the taking over the administration of a badly ruled country and granting maintenance to the dispossessed.

[1] 763. He who sleeps for two *yâmas* (*i.e.*, six hours) enjoys much happiness.

764. He should not leave his own position but conquer the enemies through Nîti.

765. Teeth, nails, hair, and kings do not look well when taken out of their proper situations.

[2] 766. The king should take shelter in the hill-forts in times of great danger, and from those places should try to recover his kingdom by violence and robbery.

[3] 767. Pandits, females and creepers do not flourish without resting grounds.

? 768-70. The king as the robber, should seize from all quarters all the wealth of the enemies for marriage, gifts and sacrifice besides the (?)

[4] 771-72. He should not live for ever in the same place, and never have implicit faith in anybody. He should always be careful but not think of death.

773-74. He must be severe, active and unkind in acts of robbery, should be against attachments to others' wives and violating the daughters of respectable families.

[5] 775-76. If subjects protected as sons become enemies at times, there is no fault of your own activity, that is your luck.

[6] 777-78. Seeing his work end in nothing he should practise penance and go to heaven.

[7] 779. Thus have been narrated in brief the duties of the king. I intend to say more in the Miscellaneous Chapter.

[8] Colophon. This is the First Chapter of *Śukranîti*, the chapter on the Duties of Princes.

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[1] The period of rest as given in that daily routine described above is 8 *muhûrtas* or $\frac{1}{4}$ of the 24 hours.

[2] समाहरेत् rescue, deliver.

[3] This describes the natural helplessness of these, and by analogy suggests the helplessness of rulers who have been driven out of their own kingdom, unless they can have their hill stations as the basis of operations against the victorious enemies. The necessity of "Protections" for the advancement of learning is also hinted at.

[4] These are the dictates of Diplomacy.

[5] The king should not blame himself for his inactivity or idleness in putting forth energy when he finds that his subjects do not appreciate his paternal care.

[6] सुविफलं thoroughly unsuccessful.

[7] समास brief, condensed form.

[8] अधिकार chapter.

CHAPTER II.

THE FUNCTIONS OF THE CROWN PRINCE AND OTHER STATE OFFICIALS.

N.B.—References are to lines, not to Slokas.

[1] 1-2. Even if the work be a trifling one it can be done with difficulty by only one individual. What can be performed by an unfriended person for a kingdom that is considerable?

[2] 3-4. Even the king who is proficient in all the sciences and a pastmaster in statecraft should never by himself study political interests without reference to ministers.

[3] 5-6. The wise ruler should ever abide by the well-thought-out decisions of councillors, office-bearers, subjects and members attending a meeting—never by his own opinions.

[1] अल्पतरं—too small, *i.e.*, insignificant, of no importance. This word is contrasted with महोदयं the epithet applied to राज्यं or state.

महोदयं—of great splendour or eminence, *i.e.*, of considerable importance in size and interests. A महोदय kingdom would thus entail heavy responsibility on the king.

किमु - what is to be said, *i.e.*, it goes without saying that a vast and flourishing kingdom cannot be managed by an individual without the aid of assistants.

These two lines introduce the idea of the importance of Councillors and assistants in public affairs and supply the *rationale* of bureaucratic organisations.

[2] नैको—not alone. The king is a god no doubt, but Hindu Sociology does not make him infallible. The limitations are fully recognised, and moral as well as constitutional restraints are imposed upon him as upon other men. The Theory of the Divine Right of Monarchs has therefore to be understood here with great modifications; and the notions of European savants about the infallibility and divinity of Kings and Popes must not be imported into the study of Hindu Socio-political institutions.

अर्थं—a generic term for interests, motives, ends, *i.e.*, whatever minister to the wants of man and satisfy his cravings : here the interests of Society as a political organisation.

सर्वविद्यासु, etc.—Śukrâchâryya like John S. Mill considers the hypothetical case of an all-*knowing ruler, and like the great English philosopher of the 18th century discusses his claims for 'absolute' rule in almost the self same way. The physical magnitude, if not* anything else, is too much for one man, and hence *one-man-rule*, however well-meaning and beneficent, is positively and unequivocably forbidden.

[3] सभ्य, etc.—Here are mentioned four classes of persons whose opinions should be studied by the ruler before adopting any measure. He is never to pursue his own ideas only. The Hindu monarch can never be arbitrary.

Ancient Hindu statesmen and philosophers placed restraints upon the king not simply by devising rules of morality and social etiquette to be strictly followed by him as by all other men but also by prescribing regular courses of instruction and training as well as by imposing what may be regarded as the positive and direct checks of a constitutional government,

[1] 7-8. The monarch who follows his own will is the cause of miseries, soon gets estranged from his kingdom and alienated with his subjects.

[2] 9-11. The wealth of intelligence is seen to be different with different men—according to (the various sources of knowledge) revealed wisdom, intuition, knowledge of Śâstras, inferential reasoning, direct observation, analogies, adventurous instincts, craft and force.

[3] 12. There are diversities of human conduct as well as grades of excellence according to the *degree* in which they are high or low.

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[1] Here are mentioned some of the evil effects of arbitrary government and one-man-rule. Three classes of evils are enumerated:—(1) अनर्थ, *i.e.*, the miseries and disasters that may befall a people, *e.g.*, poverty, crime, oppression, etc. (2) The ruler may be deprived of his राष्ट्र Cf. 'cashiering' the king for misconduct. (3) The प्रकृति or subjects generally may rise in rebellion, and there may be general misrule and anarchy all over the land.

So in the interests of himself as well as the nation, to prevent all sorts of disorders in the commonwealth as well personal ignominy and loss, the king should think thrice before making himself sole master and realising the condition implied in the passage 'I am the monarch of all I survey—My right none there is to dispute.'

स्वातन्त्र—*i.e.*, the situation in which one is one's own master—the condition of unchartered freedom in which there is nobody to control one's actions and dispute one's rights.

[2] Nine sources of human knowledge are enumerated here—*i.e.*, nine classes of intellectual gifts with which man has been endowed and may be equipped.

पुरुषे पुरुषे, etc.- There are men and men according as the nature and character of the mental outfit are considered, for the ingredients of this intellectual framework are exceedingly varied. And therefore human aptitudes and characteristics are not at all uniform but extremely diverse.

In the first place the *sources* of knowledge are various and the characteristics of men must vary with the kind of illumination they can provide for themselves—direct experience or artifice, jugglery or intuition. In the second place, it is not likely that every man should have at his command *all* these sources of intellectual power. And in the third place, the *proportion* of each possessed by all men is not the same. Nature does not, in fact, repeat itself in the making of man as in its other operations.

अनुभव—Intuitions or inward promptings of the heart.

आप्तवाक्य—the words of those who may be trusted as infallible authorities, because of their character and attainments. आप्त is a technical term in Hindu Philosophy denoting the persons who by their spiritual strength as well as gifts of intellect have attained a position in which they can directly visualise the highest truths of the universe, who are in fact *Rishis* capable of 'seeing' even in spite of spatial or temporal obstructions. Their knowledge may thus be regarded as 'revealed,' it does not come through observation or inference as that of ordinary men.

अनुमान, etc.—This list of nine kinds of human knowledge contains also the celebrated four methods of truth-investigation in Hindu logic, *e.g.*, आप्त, अनुमान (Inference), प्रत्यक्ष (direct perception) and सादृश्य (*i.e.*, उपमान analogy, similitude &c).

आगम—Text-books of Śâstras, Codes, Scriptures.

Having described the varieties of human intelligence and character, Śukrâchâryya refers in the next line to the varieties of human affairs and relations.

[3] व्यवहार—a technical term, in Hindu Social Sciences, and a most 'chartered' word conveying almost any idea. Here it means affairs, relations, conduct, situations, &c.

[1]13. *It is not possible for a single individual to know all these, i.e., the differences in* बुद्धिवैभव *(or varieties of intellectual gifts)* as well as varieties of व्यवहार.

[2]14-18. Hence for the development of the state the ruler should always appoint assistants who are high by birth, attainments and character, who are valorous, devoted and sweet-tongued, who can advise well, and bear pain, who have virtuous habits, and who by the strength of their wisdom can deliver a king who has gone astray, men who are pure, and who have no envy, passions, anger, cupidity and sloth.

[3]19. Owing to bad friends the ruler falls off from his duty as well as from his kingdom.

[4]20-21 The progeny of *Diti* were destroyed through bad associates and evil activities. Valorous and powerful monarchs like *Duryyodhan* also went to the dogs (through bad advisers).

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[1] In l. 3 Śukrâchâryya took the provisional case of an all-knowing monarch. Here he demolishes that hypothesis and rejects altogether the theory that a man may be omniscient for the very nature of the case goes against the idea.

So to the argument of physical magnitude, extensity and vastness of political interests is added that of intellectual weakness and incapability of man. Man cannot be omnipresent, he cannot also be omniscient, and therefore he must never be made omnipotent. Political checks and restraints are to follow immediately upon his natural (physical and intellectual) limitations.

[2] In selecting his assistants and advisers the king should consider the following classes of qualifications: (1) Hereditary—In all social relations, family references weigh considerably in Hindu world. (2) Moral It is to be seen whether they are free from the ordinary vices of sloth, avarice, etc., and also if their habits of life are religious धर्मरत if they are faithful and devoted to the master's interests and if they are disposed to offering healthy advi[illegible] (3) Physical—The assistants must also be painstaking, indefatigable, capable of undergoing strain and pressure of work क्लेशसह as well as bold and courageous शूर. (4) Intellectual—The councillors of kings must be pre-eminent by their wisdom and experience in order that they may be able to dissuade their masters from bad ways of life and conduct. (5) Diplomatic—They are to be प्रियंवद, *i.e.*, of gentle manners, courteous, affable and graceful in deportment, conversation and relations with kings, etc., *i.e.*, they must be perfect masters of etiquette.

भक्त devoted. This is both a moral and a political qualification. Devotion and Faithfulness are virtues not simply of private morality—but are very necessary in public life also; for obedience is the bond of rule, and vote of want of confidence is a *serious charge against a minister.* निर्मत्सर unenvious.

[3] This line supplies the *sanction* for good selection of ministers. Any body and every body should not be trusted as councillors.

[4] Instances of failure are here culled from the *Puranas* and the *Mahabharata* to prove the evil effects of bad company and injudicious selection of ministers.

बलाधिका:—having considerable prowess. Courage and strength count for nothing if counsels are bad.

[1]22. Hence the ruler should be without pride and should have good friends about him.

[2]23. The Crown-Prince and the Body of Councillors are the hands of a monarch. They are also known to be his eyes and ears, in each case right and left respectively.

[3]25-6. Without these two the ruler would be deprived of his arms, eyes and ears (*i.e.*, without any means of action). Hence he should appoint them on careful considerations. Otherwise there would be great calamity.

[4]26-27. The ruler should select as Crown-Prince the offspring of the legally married wife who can perform the tasks of the state without idleness.

[5]29-31. He may select as Crown-Prince his uncle younger than

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[1] अभिमान —egotism, over-confidence in one's own self. The king should not have too much faith in his own powers but seek the assistance of well-wishers. He should not think it beneath his dignity to be counselled by his friends. Hence the propriety of the term निरभिमान.

[2] The prince is the right hand, right eye and right ear, whereas the Ministers constitute the left hand, left eye and left ear.

The idea that these assistants are the limbs of a ruler was prevalent in the times of Papal Supremacy in mediaeval Europe when the legates, Cardinals, pardoners and other instruments of the Pope were regarded as his hands and eyes, to a certain extent, his representatives and agents in temporal and spiritual affairs of the peoples. The conception is that the rulers project themselves, so to speak, in and through their underlings and associates in order that they may successfully cope with the varied responsibility of big affairs. Like democracy or popular government, monarchy or one-man-rule also has thus to be divided into two classes, *e.g.*, direct and indirect, (*i.e.*, through representatives and agents).

सव्य—left. There is no special significance in assigning right or left place to any of these assistants. Unless it be that the Crown-Prince holds a more dignified position than the officials as the right hand is stronger than the left.

[3] The natural limitations of an individual may be considerably minimised if there are instruments to add to the sense-organs. The King's advisers are such instruments. Their observations, examinations and scrutinies reveal many facts of the political world which without them would have lain in the dark.

[4] मुद्रा—Idleness.

धर्मपत्नीज—born of धर्मपत्नी. There may be various wives according to the various classes of marriage.

धर्मपत्नी is the wife who is allowed to minister to the celebration of all religious rites.

Two conditions of the Crown-Prince—(1) birth, (2) personal merit ; he must be able to discharge the duties.

[5] पुत्रीकृतं —Neither a son nor one who is legally adopted as son; but one who, though not a son, is treated as such.

Eight persons are enumerated from among whom the Crown-prince is to be selected. If there is an uncle (father's brother) who is younger than the reigning king he should be appointed to fill that post. In his absence the next choice is his own younger brother. But if the king happens to have no younger brother, his own elder brother's son is to be Crown-prince. It is only when these three have failed that the claims of his own son come up for consideration. The claims of the adopted child for Crown-princeship are inferior to those of the person who has been treated almost as a son. Then comes the grandson through daughter and lastly the nephew through sister.

himself or younger brother or son of his elder brother, his own son or one treated as son or an adopted child or daughter's son or sister's son, successively according to failure.

[1]32-37. The ruler should not even mentally oppress those persons who are eligible to Crown-princeship for his own benefit.

[2]33-34. The ruler should very carefully protect the virtuous, valourous, faithful and good royal children even though they are young.

[3]35-37. Unless they are well guarded they are likely to be tempted by the interests and to destroy the ruler. Even when governed if they get a slight opening they forthwith kill the protector as lion-cubs kill the elephant (at the first opportunity).

[4]38-39. Royal children are like infuriated elephants without drivers. They kill even the parent, what to speak of the brother or other persons.

[5]40. Even the dullard and the child desire lordship, does not the youth ?

[1] मनसा —The king should not *think* of oppressing and molesting them. Of course the reason is clear. Mild treatment should be dealt out to those who are high by birth and are likely to create factions.

[2] It is one of the first duties of rulers to study the comforts of those persons who belong to the royal family and have 'blue blood' in their veins and who have interests in the state and its affairs. Persons who are entitled to be Crown princes demand special care of the reigning king. He should keep constant and careful watch over them, and while himself impartial, should try to uproot any disloyal or jealous feelings out of their minds.

[3] Members of the royal family are dangerous like lion-cubs. Great caution and diplomacy are required of the ruler in dealing with them. Woe unto the state and king where they are not watched and governed very carefully; for avarice, love of power and ambition will provoke hostilities and lead to anarchy and disorder.

[4] Like elephants run riot the men of royal blood are likely to create havoc in the state. History bears ample testimony to the character of members of royal family described in the last five lines. Quarrel between brother and brother, uncle and nephew, father and sons, are to be eternal facts of domestic life, in fact the natural incidents of family history—so long as man is man. The disadvantages of hereditary monarchy were ever present before the mind's eye of the Hindu political theorists. They did not live in the 'golden age' of peace and harmony but saw the same 'state of nature,' the same strife and discord that has existed through the ages, and that exists to-day. Hence the very elaborate rules about the treatment of and dealings with men belonging to the royal household which the king should make it a point to study punctiliously. The discussion which is rather of a moral and domestic character has therefore an important place in political treatises also, and is certainly relevant in *Sukranīti* which is a treatise on morals social, economic as well as political.

[6] स्म— Sign of the past tense but quite out of place here.

[1]41-42. He should keep the royal children very near to himself and always know their minds by employing craft through good servants.

[2]43-46. He should make the children of his family well up in the *Nîti Śâstras*, proficient in archery, capable of undergoing strains, and of bearing harsh words and punishments, habituated to the feats of arms, master of all arts and sciences, upright in morals as well as well-disciplined through his ministers and councillors.

[3]47-49. He should appoint them to Crown-princeship after having brought them up with good dolls, clothed them in good dress, respected them with good seats, nourished them with good food and thus made them worthy of being Crown-princes.

[4]50. The family or dynasty the children of which are undisciplined soon comes to ruin.

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[1] सन्निकर्ष—Proximity (to himself). This is the pre-condition for good management. Able servants are to be appointed who are adepts in the arts of diplomacy. In fact there should be a regular organisation to study the minds of these members of the royal family.

[2] Here is a course of instruction for children of the royal household. The education is to be at once physical, intellectual, moral, military as well as political.

धनुर्वेद and शौर्ययुद्ध—The two refer perhaps to the theoretical and applied branches of military education. The former indicates proficiency in the science of Archery, *i.e.*, military tactics and implements generally, while the latter refers to actual field work, parades, mock fights, assault-at-arms, etc., practices that call forth martial enthusiasm and develop the warlike aptitudes.

अञ्जस:—Straight and upright in morals.

The children must not be allowed to grow uncared for, they are to be brought up through a regular and systematic course of education under the direction of state officials.

[3] In ll. 43-46 Śukrâchâryya has described the system of education. Here he gives an account of the physical environment and surroundings amidst which he is to be brought up, the comforts and decencies of material life that should be offered to him for enjoyment. Good and decent living is not without its advantages in endowing the man with a cheerful disposition, optimistic outlook and hopeful visions, characteristics that are highly required of a man who has to deal with multifarious and complex interests in life. Wealth is a blessing in so far as the high standard of life which it makes possible considerably acts upon the character and tendencies of the man.

यौवराज्यार्हं - They are to be fit for this office not only by birth, intellectual and military training, etc., but also by ideas, manners and sentiments which are to be royal. Their impulses are to be generous, notions about the world and its affairs favourable. And all this is impossible unless the associations in which they are born and bred are really beautiful, opulent and magnificent.

[4] अविनीत—untrained. Here is described the effect of not properly educating royal children.

[1]51-52. The child who is of evil ways of living should not be forsaken (by the father). If oppressed, he destroys his father by having resort to enemies.

[2]53-54. He should harass the child when taking to evil ways by persons who are of evil habits, as one should bind the elephant that is wicked and wild.

[3]55-56. In the interest of state's prosperity relatives and kinsfolk who are of very evil dispositions should be carefully extirpated through tigers or enemies or through craft.

[4]57. If there be any deviation from this course they would lead to destruction of both the people and the ruler.

[5]58-59. Relatives should ever satisfy the reigning king by their own excellent merits, for otherwise they are likely to be deprived of their own shares and lives.

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[1] सुदुर्वृत्त Whose वृत्त or character or ways of living are very evil.

परित्याग etc.,—It is dangerous to play with fire. So the handling of even bad children requires careful thought.

क्लिश्यमान - troubled, oppressed.

परान्—Others, *i.e.*, enemies. The enemies' ranks are likely to be swelled by the access of the ill-treated child.

[2] Wicked persons are to be set right through wicked characters.

व्यसन—A generic name for vices and passions.

व्यसनाश्रयैः—By those who take to vicious ways.

उद्वृत्त—Unrestrained, ill-behaved.

[3] दायाद—Those who receive shares of or participate in the estates, *i.e.*, kith and kin of the king.

दाय—that which can be inherited, property, estates, etc.

Wicked relatives are to be crushed by hook or by crook.

These lines continue the idea suggested in ll. 34-40 about the treatment of persons of royal blood.

[4] अतोऽन्यथा, *i.e.*—If the wicked relatives are not struck down immediately they begin to rise, the interests of the state will be jeopardised.

[5] Having described the careful and cautious dealings of kings with their kith and kin Śukrâchâryya takes the other side of the shield and prescribes the proper behaviour of दायादs towards their ruler. Of course unless these people are well behaved they are sure to forfeit their claims.

परैः— Excellent.

तोषयेयुः—Satisfy and please, not necessarily flatter. Their records of work as well as habits of life must be approved of by the ruler. They should thus deserve the honour and dignity bestowed on them as members of the royal family.

जीवितादपि—Their lives also may be insecure if they do not care to conform to the standard of faithfulness and devotion expected of them as participants दायाद in the royal estates.

[1]60-61. Those who have no near relatives, those who are born of other persons and the adopted sons should never even mentally be regarded as one's own children.

[2]62. They desire to be adopted of a person after knowing him to be rich.

[3]63-64. Hence the son of girls belonging to the same dynasty is superior to the others (mentioned above). For the daughter, like the son, is descended from the same limbs (and hence has the same feelings).

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[1] सापिण्डय—सापिण्ड is a Hindu legal term denoting "a kinsman, especially one connected by the offering of the funeral cake to either or all of the manes of the father, grandfather, and great-grandfather, and their wives respectively, as sprung from them in directly collateral lines ; the relationship stops with every fourth person, as the fifth cannot perform the offering of a cake to the father even of the deceased."

The following are enumerated as *Sapindas* :—the son, the son's son, and son's grandson; widow, daughter, and daughter's son ; the father, the mother the brother, brother's son, and brother's grandson ; father's daughter's son ; father's brother's son and grandson ; paternal grandfather's daughter's son ; paternal grandfather ; paternal grandmother ; paternal grandfather's brother ; brother's son and grandson ; and lastly, the great grandfather's daughter's son."—*Wilson's Dictionary.*

सापिण्डय—The condition of having सापिण्ड, *i.e.*, one or other of the relatives mentioned above. The idea here is that those persons who cannot refer to one or other of such kinsfolk and indicate their family relations should by no means be regarded as one's own children. Such persons are, practically speaking 'tribeless, clanless' foundlings and can never appreciate the normal filial feelings and paternal sentiments of ordinary human beings.

Three classes of men should not be considered as one's own children—(1) those who belong to no family and cannot refer to any of their own relatives; (2) those who are known to be born of other families; (3) those who have been legally adopted.

स्वसुत—*i.e.*, one's own offspring. The advice here given is expressed in the well known phrase 'Blood is thicker than water.' Any body and every body cannot be successfully received as members of one's own family, tied to it by natural affections and thoroughly identified with its interests.

[2] धनिकं—It is self-interest that impels men to be adopted children to somebody. They try to get themselves adopted by a man whom they find to be wealthy.

This line supplies the reason why adopted sons are never to be regarded as स्वसुत.

[3] Sukrâchâryya has been discussing the question of adoption. Here are described the persons from among whom the selection is to be made. He is of opinion that offsprings of the same dynasty should be preferred to those who are mere vagabonds.

कन्या—Here are advanced some of the general claims of the daughter which according to *Sukraniti* are not at all inferior to those of the son. The daughter participates as much in the flesh and blood of the parents as the son. Hence the offsprings of girl should not be considered in any way inferior to those of the male issues. Rights of women are thus ably advocated.

अङ्गादङ्गाद्—Limb by limb, *i.e.*, each portion of the body of the daughter (and the son) is derived from the limbs of the progenitor.

[1]65. *Hence there is no difference between the son and the daughter's* son as regards the offering of cakes to ancestors.

[2]66. The king is to maintain an adopted son in the interests of his territory as well as subjects.

[3]67. The ruler should have wealth for the protection of his subjects, not for other purposes.

[4]68-69. He bequeaths everything to another's son by adopting him as his own child. What can be more strange if he does not give charities and offer sacrifices ?

[5]70-73. After attaining Crown-princeship one should not get demoralised, should not insult or oppress (owing to the vanity of one's own wealth) one's mother, father, preceptor, brother and sister or the favourites and dear ones of the reigning king or the commonalty of the realm.

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[1] That the daughter or woman generally is not to be despised is sufficiently indicated, according to Sukrâchâryya, by the regulation that the male issue of the daughter is as much entitled to the funeral rites as the son himself.

पिण्ड—An oblation to deceased ancestors, as a ball or lump of rice mixed up with milk, curds, flowers, &c., offered to the manes by nearest surviving relations.

[2] The adoption is not for personal satisfaction but for the proper administration of the interests of the state.

[3] The king's wealth is sacred and must not be misspent. Here is a sly hit at the practice of adopting sons and spending money over them. The next two lines make it more clear.

[4] If it is possible for a man to adopt into one's family men born outside it is to be expected that he should spend some money at any rate on sacrifices and in charities. So that the poorer classes as well as priests may derive some share of royal wealth.

A conflict between national interests and the interests of the adopted child is brought out here. That the right of adoption is to a certain extent prejudicial to the collective weal of the people at large was conceived by philosophers of the Hindu world. Here is a mild protest against the custom.

दान -(Charity, gifts, &c.) and यजन (sacrifices, worship, &c.) are the two items which are interfered with by expenditure over adopted sons. The money which is meant for प्रजापालन (maintenance of subjects, l. 67) *e.g.*, through charities and sacrificial festivals is spent on men who come into the royal family not even by the accident of birth but by a legal fiction, perhaps by his whim.

[5] Newly installed Crown-princes are likely to be insolent, rude and haughty like upstarts. And persons likely to bear most the brunt of their affront have been divided here into three classes—(1) members of their own family, relatives and kinsfolk ; (2) राजवल्लभ - friends and favourites of the king, *e.g.*, those who also might be similarly installed in case of his absence, and hence who are likely to be jealous rivals ; (3) महाजनान्—the public at large, the subjects generally. It is very desirable that the Crown-prince should be able to establish an empire over the hearts of the people. महाजन—Does not mean a great or illustrious man, but a collective people.

अवमन्येत्—Look down upon.

स्वसम्पत्तिमद्—Vanity due to the newly acquired position and wealth as Crown-prince.

[1]74-75. But if somebody who is outside the royal clan or family wants admittance into it the good people do not tolerate such presentation of an outsider to the king.

[2]76-77. Even after attaining great prosperity he should abide by his father's command, for to a child the father's command is his best ornament.

[3]78-79. The mother was killed by Bhârgava, and Rama went to forest according to their father's commands And it was through the strength of their fathers' penances that they respectively got back their mother and kingdom.

[4]80. The command of him who has the two-fold right of cursing and blessing is very weighty.

[5]81-82. He should not display his greatness to all his brothers; for Suyodhana was ruined through the insult meted to the brothers who had also right to the wealth.

[6]83-85. Owing to the violation of father's commands royal offsprings even after attaining excellent positions are thrown down like menial servants, *e.g.*, the sons of Yayâti and Viśwâmitra.

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[1] The Crown-prince has been advised to behave well with all persons. But here he is asked to make a difference with regard to one point, *viz.*, नाभिप्रदर्शनं *i.e.*, seeing the king (नाभि).

मषयन्ति—Do not bear or tolerate, *i.e*, the prince should not allow the outsider to appear before the king. He should be judicious enough to make the choice as to who should be presented and who not.

[2] **वृद्धि**--Increase, affluence, prosperity.

[3] The common traditional stories about Paraśurâma and Rama are here pressed into service to prove the authority of father and the efficacy of obedience to father. Sons who obey their fathers are successful in life.

[4] The command of such persons must be respected.

[5] **आधिक्यं**—Difference in prosperity. It is always a bad policy to make a display of one's strength before those who have reasons to be jealous. Such an injudicious display is positively mischievous, it is tantamount to ill-treating and insulting them and exciting their worst passions.

भागार्हे—Those who deserve a share.

The advice given here is very sound in the administration of domestic and other social affairs. And as hereditary monarchy has more or less the characteristics of a domestic household, being essentially patriarchal in nature, the rules of dealings with kith and kin are not out of place in political treatises.

[6] Instances of obedient and devoted sons have been recorded in ll 77-8. Here are given intances of failure through disobedience.

[1]*86-87. One should always be in the habit of serving one's father* in word, thought and action. One should ever do that by which father is satisfied, one should not do that by which father gets pain even for a single occasion.

89-90. One should oneself do that with pleasure in which there is father's pleasure. And one with whom the father is dissatisfied should be his object of enmity.

91. One should not do anything that is disapproved or opposed by father.

[2]92-93. If through the faults of flatterers and informers the father is far from what he ought to be, one should study his nature and manage to explain matters to him in a retired place.

[3]94. Otherwise he should always punish the flatterers very severely.

95. And he should ever know the inward feelings of the subjects through artifices.

96-97. In the morning of every day he should bow down to his father, mother and preceptor. He should then narrate to the king the work done day after day.

[4]98-99. Thus living in the house and maintaining the unity of the family the Crown-Prince should satisfy the subjects well by his learning, actions and character.

[5]100. He should also be self-sacrificing and vigorous and thus bring within his sway all around him.

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[1] मनाक्—Once.

विषीदति—Gets displeased.

[2] It is not unlikely that the father may be misled by चार, *i. e.*, informers, spies, etc., and सूचकs, *i. e.*, flatterers, detractors, etc. In that case it would be the duty of the son to keep him to the right path. But then he should not do it in an ostentatious and haughty fashion.

He should study his humour प्रकृति and explain to him in a manner that is adapted to it अनुमतं. So that his attempt may not fall flat. And the advice is to be given in secret places.

प्रकृत्यनुमतं कृत्वा—In a manner that is acceptable to him.

[3] अनुदिनं—Day after day, *i.e.*, every morning he should relate what he did during the day previous.

[4] His work is to have two-fold effect—(1) the Family or House must not lose its integrity—there must be अविरोध; (2) The people must be happy.

[5] The supremacy is to be established not only by सत्त्व or physical vigour but by त्याग moral strength of sacrifice also.

[1]101. He is to grow slowly like the portion of the moon in the bright fortnight.

102-103. The prince who behaves himself in the manner described above having got the kingdom that is thornless enjoys for ever the earth with his associates and councillors.

104. Thus has been narrated in brief the function of the Crown-prince that is beneficial.

[2]105. Now are being related in brief the functions and characteristics of the councillors.

106-109. Just as gold is tested by experts by reference to lightness or heaviness of weight, colour, sound, etc., so also one should examine servants (or office-bearers) by reference to their work, companionship, merits, habits, family relations, etc., and place confidence in one who is found to be trustworthy.

[3]110. One should not notice only the caste (or race) or only the family (in making the selection).

111-112. Work, character and merit—these three are to be respected—neither caste nor family. Neither by caste nor by family can superiority be asserted.

[4]113. In marriages and dinner parties considerations of family and caste are compulsory.

[5]114-117. The truthful, the meritorious, the celebrated and the wealthy, as well as men who have been born in good families, whose habits are

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[1] समासतः—Briefly, synoptically.

[2] सहवास – Of course a man is known by the company he keeps.

परीक्षयेत्—Anybody and everybody is not to be appointed to any post. All candidates must pass through the process of examination and selection. The selected candidate must be able to satisfy the master in the particular points enumerated.

[3] Considerations of birth and family are important no doubt, but these are not the sole points to be brought out in selecting persons for public offices.

[4] That is, in purely social functions, race, caste, birth, etc., have to be most seriously considered. But when the question is of appointment to political offices these considerations should weigh very little to the master or officer in charge.

नित्यं—Always, *i.e.*, compulsory.

Śukrâchâryya makes a distinction between spheres of human activity and remarks that caste considerations apply not to all departments of human life but only to certain defined aspects, *e.g.*, marriage, dining, etc. Hence much of the so-called vices of caste system is the idle product of men's imagination. The criticism that it is based on injustice cannot stand.

[5] Such persons are likely to be conscientious and their discharge of duties strictly rigid.

अभिजन:—(1) Family ; (2) Fame. Here the latter, for otherwise, अभिजनवान् would be repetition of सुकुल: *i.e.*, well connected.

A few more characteristics of good servants are enumerated below.

good, who do good deeds and have no sloth—perform the duties of their master even better than their own work by the four-fold qualities of body, speech, thought and diligence.

118-119. (The good office-bearer) is satisfied with his salary only, is sweet-tongued, expert in actions, pure and firm ; skilful in doing good to others and is averse to evil ways.

[1]119-120. He observes even the son or the father who does injury to the master ; is not similar to the lord who goes astray, but understands well (the situations).

[2]121. He does not protest against the statements of his master, nor does he give publicity to any of his shortcomings.

[3]123. He is not procrastinating in good measures but procrastinating (and dilatory) in evil ones.

124. He never picks holes in the coats of his master's wife, children and friends.

[4]125. Towards his master's wife, children and friends he bears the same attitude as the master himself.

[5]126. He does not appraise himself, nor does he defy anybody. He does not envy or insult anyone.

127. He does not want the rights belonging to others, but is unambitious and always contented.

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[1] The good officer is he who is impartial and does not fear to expose the faults and vices of even near relatives, and who does not pander to the evil tastes and habits of the master *but is firm and strong (in dissuading him from them).*

दर्शक:—*observer, watcher, scrutiniser.*

आगस्कारिणं—Who commits offence, acts against the interests.

आगस्—Fault, crime.

अतद्रूप—Not like him.

तद्रूप—*i.e.*, not a mere echo of the master, not a sycophant but has his own individuality.

The son's activities may go against the interests of the master, the father's activities also may point the same way. Even the master himself may adopt suicidal measures. In these cases it is only the good servant who can intervene and by boldly asserting his individuality rescue the state from ruin and calamity.

सुबोधक—One who can well understand situations.

[2] आक्षेप्ता—One who protests.

गिरं—Word.

न्यून—Defects.

[3] He follows the principle 'Love me, love my dog.'

[4] तद्वद्बुद्धि—*i.e.*, one who thinks in (or whose *thought* is of) the same manner as the master himself. He is thoroughly identified with his master's interests and looks upon all his concerns as his own.

[5] अधिकारं—Rights, jurisdiction. The good officer is not interfering, does not unduly hope for other's privileges.

[1]128. He bears or puts on the clothes, ornaments, &c., offered by him and ever stands before him.

[2]129. He spends according to his salary, is moderate, kind and also courageous.

[3]130. Lastly, the excellent servant is he who discusses the evil deeds of his master privately, *i.e.*, does not give publicity to them.

[4]131. The servant with attributes contrary to those mentioned above is known to be bad.

132. Those who are underpaid, those who have been coerced by punishment, cheats, the miserable, the greedy, and those who speak well in one's presence.

[5]134-138. The passionate, the vicious, the diseased, those who seek bribes, the gamblers, the atheists, the vain and untruthful as well as the envious people; those who have been insulted, and touched to the quick by harsh words, the friends and servants of enemies, and those who keep up old enmities, the ferocious and the daring, as also the irreligious people can never be good officers.

[6]139. The marks of good and bad servants have been enumerated concisely.

140. Now are described the characteristics of priests and other officers.

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[1] धारकं—He puts on the insignia, badges, &c., indicating his rank and function and is ever ready to serve his master.

[2] भृति—Salary. *One of the characteristics of good officers is frugality and moderation* in expenditure.

Persons who are spendthrifts and extravagant in their private capacity are likely to bring disasters upon the state by injudicious administration of public interests. Hence an individual's extravagance is not only a personal foible but has also a serious significance in political and social affairs. The man, therefore, who spends within his means is good not only as a private citizen but is also an acquisition to the state.

[3] Having described some of the characteristics of the good officers, Śukrâchâryya is going to mention a few marks by which bad servants are to be known. Of course quite the opposite attributes will be predicated of them.

[4] हीनभृतिका—Those whose salaries are low. Low paid officers are never to be trusted with responsible work and are not expected to render faithful service.

Of course, the men described in these lines are good for nothing.

[5] अभ्यसूयका:— Malicious, envious.

आर्त्तं— Diseased.

व्यसनिन:—Those who are addicted to vices, *e.g.*, hunting.

देविन:—Gamblers—those who play at dice.

अनुबन्धिन:—Those who continue.

प्रकर्षिता—*i.e.*, censured for neglects of duty.

[6] पुरोधा— Priest.

[1] 141-143. The priest, the viceroy, the premier, the commander, the councillor, the judge, the scholar, the *Sumantraka*, the ***Amâtya***, as well the spy—these are the ten departments of a king.

[2] 144. Whose incomes are one-tenth more than those of subsequent men up to the spies.

[3] 145-147. The king is said to have eight departments or requisites of regal administration according to some people.

[4] 148. These eight departments of political organisation have equal remuneration.

[5] 149. The spy who is well up in (the art of reading) emotions and gestures (expressions) is a servant of these eight.

[6] 150-155. The priest is superior to all others—the main-stay of the king and kingdom. The Viceroy comes next, next the Premier; then the

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[1] सचिव, मन्त्री, आमात्य and सुमन्त्रक are different ministers with different functions.

प्रधान—Chief Secretary, superintendent, premier.

सचिव—Commander, War Minister.

मन्त्री—Councillor, diplomatist.

सुमन्त्रक Finance Minister.

अमात्य—Ordinary Minister.

प्रकृतय:—Advisers, requisites of regal administration. Departments of Executive Government.

प्राड्विवाक:—One who asks (प्राड्) as well as decides; The Justice.

[2] That is, the income of पुरोधा: is one-tenth greater than that of *Pratinidhi*. That of *Pratinidhi* one-tenth greater than that of *Pradhâna*, and so on.

[3] The eight requisites are Sumantra, Scholar, Minister, Pradhâna, Sachiva, Amâtya, Justice, and Viceroy.

[4] भृतिसमा:—Those whose incomes are equal. There are two systems of political organisation. According to the first the incomes vary in a certain proportion, there is a gradation of salary. According to the second there is equality of income.

[5] In the second list दूत has no place. But the spy is too important an office-bearer to be ignored. Hence according to the second theory he is retained as the follower or अनुग of the main departments.

इङ्गित—The emotions and feelings of the mind.

आकार—Expressions or manifestations of feeling through gesticulations, physical gestures.

तत्व—Science, here the art of studying the mind and its external manifestations. It goes without saying that the spy must be an adept in this art.

The ll. 145-149 introduce paranthetically, as it were, the new conception of political departments, and mention it here only as a piece of information. Śukrâchâryya does not accept it himself.

[6] पूर्वश्रेष्ठा:—The former among whom was superior to the latter.

Having described the salary, precedence and social as well as political status of the 10 classes of administrative authorities, Śukrâchâryya goes on to describe the functions and qualifications of each.

राष्ट्रभृत्—Pillar of the State.

Sachiva, then the Minister, next the Justice, then the Scholar; next comes Sumantra, then the Amâtya, lastly the Spy; these officers are successively meritorious in order.

[1]156-160. One who is versed in *mantras* and rituals, master of the three sciences, skilful at work, conqueror of the senses, subduer of anger, devoid of greed and passions, equipped with a knowledge of six Angas (*Vedângas*) and of the science of Archery with all its branches, one who knows the science of moral as well as religious interests, one fearing whose anger even the king takes to virtuous ways of life, one who is well up in *Niti Śâstra* and master of military implements and tactics is the Priest.

161. The Priest is also the *âchâryya* and he is competent both to curse and bless.

162. Without the advice of the *Prakṛitis*, *i.e.*, the Executive officers, the state is sure to be destroyed.

[2]163. If the king fears their control, they are good ministers.

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[1] The enumeration of the attributes of a priest gives some idea of the all-round culture he is to have. Not a mere knowledge of the technique of sacrificial rites and ceremonies, but a sound liberal education is expected of him. That he should have the moral qualities of moderation, abstemiousness and self-control goes without saying. He must also be smart and active कर्म्मतत्पर. What is of special significance in the list is the mention of the several branches of learning he should master—(1) The Three Vedas technically known as त्रयी; (2) The six Vedangas—sciences which introduce learners to the study of the Vedas, without which no one can understand and appreciate the master sciences. These are known as (*a*) शिक्षा—The Science of pronunciation and articulation; (*b*) कल्प—The detail of religious ceremonies; (*c*) व्याकरण Grammar; (*d*) छन्दः Prosody; (*e*) ज्योतिष Astronomy; (*f*) निरुक्त Explanation of difficult or obscure words and phrases that occur in the Vedas. (3) The military science with all its branches; धनुर्वेद or the Science of archery is a generic name for the science governing all martial exploits; (4) The Science of religious interests of men. (5) Niti Śâstra—Science of social, economic, and political morals. (6) The art of warfare. Practical training is here implied, as theoretical knowledge of warlike feats is suggested by धनुर्वेदवित्.

Thus apart from the moral and physical training the system of education for priests includes within intellectual culture a training in Economics, Theology, Sociology and Military Science.

व्यूह—Arrays of soldiers, their grouping and management on fields.

[2] निरोधन—Control, discipline, pressure.

A good minister is he whom (whose regulations) the king fears.

The polity described in *Sukraniti* is formally despotic; but it recognises only such ministers as ideal as are not merely 'king's friends' or 'king's men' working like his private secretaries or confidential clerks, but have an individuality and independence of character by which they can control the whims and caprices of the monarch and systematically govern the course of the state's action.

[1]164-165. Can there be prosperity of the kingdom if there be ministers whom the ruler does not fear? Such ministers are to be gratified like women with decorations, liveries of honour, etc.

[2]166-167. If there be no improvement in the state whether in extent, population, efficiency, revenue or administration; if, on the contrary, the state be jeopardised through the ministers' counsels, what is the good of having such men (as king's advisers)?

[3]168-173. The *Pratinidhi* or vice-regent is he who knows what is to be done, and what is not to be done. The *Pradhâna* is he who has eye on

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[1] Independence of ministers is the criterion of national well-being. Men who dare not raise their voice against the king have no place in the councils of states but should be retained as ornamental figureheads and 'dignified parts' of the constitution. They do not deserve any effective control over statecraft and should be humoured by grants of titles, honours and distinctions.

They are no better than women who are satisfied with trinkets and dainties.

[2] नृपत्वं—The function of a king, rule, administration, government.

Some other general tests of good ministers are mentioned here. They must be able to display their ability and justify their existence by adding to the state's resources, territory, influence or prestige.

[3] The several ministers of the king who are heads of several departments are mentioned here. The Hindu technical terms and English equivalents are given below:

पुरोधा—Priest.

प्रतिनिधि—Viceroy.

प्रधान—Superintendent, Chief Secretary.

सचिव—War Secretary.

मन्त्री—Diplomatist, Foreign Secretary.

पंडित—Learned adviser.

प्राड्विवाक्—Chief Justice.

अमात्य—Land Revenue Officer.

सुमंत्र—Finance Minister.

दूत—Ambassador.

The differentiation of the Executive into so many departments each with its own functions and own chief indicates a highly organised political fabric. The statement of qualifications required of each minister is also the product of a deep insight into the functions of the state. The picture thus presented is not one of a simple primitive political life in which the 'man in the street' is fit to be a judge, a warrior and a ruler by turn, but one of a complex organization which requires specialized functionaries for the efficient discharge of its functions and hence demands of each a specialised training as Judge, Commander, Financier, &c.

l. 170. The *Mantri* or Foreign Secretary must be proficient in *Niti*, *i.e.*, the art of life (or the rules for the good management of practical affairs). He must therefore know what to do under what circumstances. This is what is meant in modern times by 'expediency.'

l. 171. The *Prâdvivâka* or Chief Justice must be proficient in three Sciences—that which deals with men (Sociology or History), that which treats of the rules laid down by (supervises) all things. The *Sachiva* is the man who knows all about the army. The *Mantri* is one who is adept in diplomacy. The *Pandit* is the person who is well up in the theory of religion and morals. The *Prâdvivâka* is he who has knowledge of men, Śâstras and morals. The *Amâtya* is known to be the person who has knowledge of lands and records. The *Sumantra* is he who knows of the incomes and disbursements.

[1]174-175. That man is chosen as ambassador who knows the innermost feelings of other men, who can study their expressions and movements, and who has a good memory, knows the conditions of time and place, can speak well, and is fearless.

[2]176-178. The *Pratinidhi* should always advise kings as to when a thing should be done immediately even though it is evil and when to refrain from doing a thing though it is good (at the proper time); make them act up to his advice; and if they do not abide by him, he should go on explaining.

[3]179-180. The *Pradhana* has to discriminate between truth and untruth and find out the total amount of work among the functions discharged by all.

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sages and Rishis in Śâstras (Theology, &c.) and that which treats of manners, customs, and morals handed down from generation to generation (Morality or Ethics). All the Sciences enumerated here are human and social; and the Judge has to qualify himself specially in these for he has always to deal mainly with men and manners.

l. 172. देश—Lands, लेख—writings or records. Perhaps a knowledge of tenures and rights is implied here. The *Amâtya* is thus a Cadastral Settlement or Survey Minister.

[1] इङ्गित -inward feelings. The ambassador must be able to study the mind's thoughts. आकार—facial expressions or outward manifestations of sentiments through the physical organs, *e.g.*, in speech, gesticulations, movements of limbs, &c., चेष्टा activity, enterprise. The ambassador must also keep news of the movements of the persons he studies.

He must have a retentive memory for he may have to communicate many things orally which it might be inexpedient to transmit in black and white. It is easy to understand why he should be a master of Geography and History (देश and काल i.e., space and time) and also a good speaker. For unless he is well-grounded in the actual conditions of time and place and the special characteristics of the relations between persons he has to deal with he is likely to misunderstand or misrepresent facts and thus bungle with the state's affairs.

[2] The Vice-regent is not merely to ditto the king at every step but must be bold enough to forbid bad courses of action, and recommend what appears to be good at the proper time.

[3] He is something like a general supervisor over all the affairs of the state and a controller of office systems.

कार्य्यजात—Amount of work,

[1]181-190. The *Sachiva* has to study the elephants, horses, chariots, foot-soldiers, camels, oxen, bandsmen, ensign bearers, men who practise battle-arrays, men who are sent out eastward and westward (on mission), bearers of royal emblems, arms and weapons, attendants of superior, ordinary and inferior grades, and the various classes of ammunitions; he has to find out the groups that are complete in all their parts, how many of these are in active condition, how many are old and how many new, how many are unfit for work, how many troops are well equipped with arms, ordnance and gunpowder, and what is the amount of commissariat and other contingencies. Then he has to communicate the result of his studies to the king.

[2]191-193. The *Mantri* has to study when, how and to whom the policies of Peace, Purchase, Partition and Penalty have to be adopted and the various effects of each whether great, moderate or small; and having decided on the course of action to communicate that to the king.

[3]194-199. The Chief Justice should advise the king after examining, with the help of his peers in Council, the men who have brought forward suits for judgment, by witnesses, written documents, artifices, and by occult processes to find out which method or procedure is likely to be most efficacious in which case, and after determining what is the inevitable decision by the application of reasoning, direct observation, inference, analogy as well as the local customs.

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[1] संघ—Groups.

साद्यस्क—New.

अग्निचूर्ण—Gunpowder.

सम्भार—Necessaries and contingencies of war.

[2] साम, etc.—The four policies mentioned here are the orthodox methods of dealing with international affairs in Hindu treatises on Politics. The *Mantri* is thus the Foreign Secretary.

संचिन्त्य—*Considering or studying.*

निश्चित्य—Determining or deciding.

[3] The Judicial procedure is fully described here. (1) The Chief Justice is not to act alone but is to be helped by सभ्य. He is to be ससभ्य. (2) The judgment is to be public, for he is to be सभास्थित (seated in the assembly). (3) The examination is to be conducted in as many ways as possible so that the whole truth may be discovered. Even दिव्य संसाधन *i.e.*, mystical or occult processes have to be resorted to in order to discover the proper method of attacking a problem. (4) The sentence is to be delivered after careful weighing of evidence. All the methods of truth-investigation known in Hindu Logic have to be used. The लोकशास्त्र or manners, morals and customs of the folk that have been handed down from generations must also be investigated. For otherwise the judgment might be correct in theory but wrong in practice, in fact, quite out of place,

[1]200-203. The Pandit has to study the rules of moral life obtaining in society in ancient and modern times, which have been mentioned in the codes, which are now opposed, and which militate against the customs of the folk, and to advise the king by those which are efficacious both for his life and hereafter.

[2]204-206. The *Sumantra* should communicate to the king the amount of commodities laid by, the amount of debts, &c., the amount spent, and the amount of surplus or balance in both moveables and immoveables during the course of the year.

[3]207-208. How many cities, villages and forests are there, the amount of land cultivated, who is the receiver of the rent, the amount of revenue realised.

209-210. Who receives the remainder after paying off the rent, how much land remains uncultivated, the amount of revenue realised through taxes and fines.

211-212. The amount realised without cultivation (*i.e*, as Nature's gifts), how much accrues from forests, the amount realised through mines and jewels.

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[1] Various classes of rules and regulations of life are here enumerated. There cannot be a uniform standard of moral conduct—it is implied. It must vary according to place, time, and circumstances.

लोकशास्त्रविरुद्ध—The possibility of a Pandit being opposed to the manners and customs of the people is thus indicated.

It is the function of the Pandit to study the manners and customs and always to be in touch with the latest thoughts and opinions of the people, *i.e.*, to grow with the world.

Sukrâchâryya is not an advocate of fixed codes of morality and religion that must be absolutely respected at all times and places and under any circumstances whatever, but recognises the relativity of religious and moral sentiments and practices to the social and other conditions of the world.

[2] The सुमन्त्र or Finance Minister has to study the Budget and Revenues and prepare the schedule of Credits and Debits, Assets and Liabilities of the State. He has, in fact, to frame what is called the Balance-sheet.

[3] The Financial affairs are distributed between *the* सुमन्त्र *who is in charge of the Budget and the* अमात्य *who is in charge of Land settlement and records.*

The following sources of revenue are mentioned :—

(1) भाग—Rent from land.

(2) शुल्क—Duties or taxes.

(3) दण्ड—Fines.

(4) अकृष्टपच्या—*i.e.*, what is received without cultivation or care. Nature's contribution.

(5) अरण्यसम्भव—Income from forests.

(6) आकर—Mineral wealth.

(7) निधिप्राप्त—Deposits as in a bank.

(8) अस्वामिक—Unowned. All unclaimed property belongs to the state.

(9) तस्कराहृत—Got back from thieves.

213-214. How much is collected as unowned or unclaimed by anybody, got back from the thief, and the amount stored up,—knowing these things the *Amâtya* should inform the king.

[1]215-216. The characteristics and functions of the ten chief advisers have been mentioned in brief. One should know them by the records of work given by each.

217. The king should appoint them to each post by rotation.

[2]218-219. The king should not make his officers more powerful than himself, and the ten *Prakritis* should be entrusted with equal power.

[3]220-224. He should always appoint three men for each department —the wisest of them all at the head and the two others as overseers, for three, five, seven or ten years, and having noticed each officer's qualifications for the work entrusted he should make the necessary changes.

[4]225. The king should never give office for ever to any body and everybody.

226-227. He should appoint men to offices after examining the fitness of the persons for them. For who does not get intoxicated by drinking of the vanity of offices?

[5]228-230. So he should appoint others after seeing that they are fit to discharge the functions, or the apprentices who are qualified for that task as paid officers, or outsiders in their absence.

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[1] Each officer is thus to be made competent for all functions of the state through taking part in each for certain periods.

परिवृं—The system of training up officers by rotation. But it is difficult to see how the priestly function can be discharged by the others.

[2] समबल—Of equal authority. Is the theory of checks and balances implied here?

[3] Here are rules for the management of each अधिकार or jurisdiction, *i.e.*, department.

दर्शक—*Inspectors, overseers.*

हायन—*Year. The term of office or tenure of appointment is for 3, 5, 7, or 10 years according to* कार्यकौशल्य *i.e., qualifications.*

[4] Śukrâchâryya warns the king against bestowal of permanent offices. Appointments to posts should be, according to him, during good behaviour. If the pride of position bewilders the officer and he proves unworthy of the responsibility he should be dismissed. Work is the sole test and recommendation for office.

[5] When somebody is found to be unworthy of the work entrusted to him others are to be appointed. In such a case the claims of तत् पदानुगत, *i.e.*, those who follow in his heels (*e. g.*, subordinates and apprentices) should be considered. And these should be appointed on salary वर्तने.

231. He should appoint men who have his qualifications or his sons to his post.

[1]232-233. As the officer becomes qualified for the higher and higher functions he should be appointed to the higher and higher post. At the end he should be a *Prakriti* (one of the 10 advisers).

[2]234-235. He should appoint many overseers or appoint only one officer without any overseer at all according to the importance of the jurisdiction to be managed.

[3]236. He should appoint for other works those who are fit.

237-238. He should appoint separately the heads of elephants, horses, chariots, infantry, cattle, camels, deer, birds, gold, jewels, silver, clothes.

[4]239. The chief of treasure, the chief of grains, and the superintendent of cooking.

[5]240-241. The superintendent of parks, and the head of buildings and palaces separately, as also always the superintendent of the necessaries and contingencies, the officer in charge of the religious establishments and the supervisor of charities.

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[1] These lines describe a regular system of translation and promotion through qualification and aptitude for successively higher posts leading ultimately to the immediate advisers and councillors of the king. The officer is to begin at the lowest rung of the administrative ladder, but by displaying his ability in the lower grades, may be lifted up to the post of highest responsibility.

All these rules about the training of officers, tenure of service, organisation of the office, the filling up of vacancies, rotation and gradual promotion are the outcome of a highly developed political machinery that would be required in a vast country-state or an empire. *Sukraniti* is adapted to the requirements not of village-commonwealths or city-states but extensive national organisations.

अनुक्रमेण—In succession. The amount of work to be done and the number and variety of interests to be administered must be very large in order to allow for the scientific division of labour and the methods of scientific specialisation and transfer prescribed in these lines.

[2] अधिकार Office, jurisdiction. The proportion of inspectors to actual workers is to be determined scientifically according to the nature of the interests to be administered.

[3] पृथक्—Each of these things is to be in charge of a separate officer. But it is difficult to see how and why some of these responsibilities can be parted from each other, *e.g.*, What is the good of having separate officers for gold, jewels and silver? This is specialisation carried too far. Or perhaps all these things are to go together, as implied in ll. 303-4.

[4] The treasurer, the head of the granary and kitchen-superintendent are separate officers as they should be.

The granary is a very important feature of Hindu economic and social life.

[5] देवतुष्टिपति—A separate officer is required for administering the institutions for the satisfaction of gods, *e.g.*, temples, *Dharmaśalas*, &c., which are likely to be too many in Hindu society.

242-245. The lord of साहस, the headman of the village, the collector of land revenues, the clerk, the collector of taxes (tolls and duties), as also the news-bearer—these six are to be appointed in each village and town.

[1]246-50. Those who practise penances, those who are charitable, those who are proficient in revealed literature (the Vedas) and *Smṛitis*, those who are well versed in *Purâṇas*, those who know the *Śâstras*, (other than the *Srutis*, *Smṛitis* and *Purâṇas*) the astrologers, the sorcerers, those who are masters of *Ayurveda* (medical science), those who are versed in the religious rites and ceremonies, those who practise the virtues laid down in *Tantras* and those others who are meritorious, intelligent and masters of their passions—these classes of men the king should worship and maintain by stipends, gifts and honours.

[2]251. Otherwise the king is disparaged and earns an ill name.

[3]252-253. There are many functions which involve a multiplicity of effects. The king should appoint officers for the discharge of such functions also after considering their fitness for these.

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[1] Some special charges on the state are those men who are morally or intellectually deserving of help.

They are to be respected by grants of scholarship (भृत्या,), gifts of land or other things (दान) and titles of honour or distinction (मान).

In enumerating the intellectual qualifications entitling a man to such honours and aids *Sukrâchâryya* mentions perhaps all the varieties of विद्या prevalent in his time—(1) श्रुति,—The Vedas; (2) स्मृति (3) पुराण—Puranas; (4) शास्त्र (5) दैव—Divination (astrology). (6) मन्त्र—Hymns and incantations, *e.g.*, those of the Atharva-Veda which are efficacious in many social troubles; (7) आयुर्वेद—The science and art of medicine; (8) कर्म्मकाण्ड,—The religious rites and usages—sacrifices and offerings to gods; (9) तन्त्र - *Tantras*.

The enumeration of these branches of learning in this connexion indicates a comparatively modern stage of socio-political life in two ways. In the first place, the fact that even कर्म्मकाण्ड, मन्त्र and तन्त्र entitle the persons to distinctions and aids of the state equally as the *Śrutis* is an index to the great liberalisation of intellect that must have been prevalent at the time. In the second place the branches of learning must have been many and diversified for long in order that there might be specialists in each. It is doubtful if *Tantras* and men adept in the rites prescribed therein could be noticed in Pre-Buddhistic age, say the age of *Śrutis*.

[2] This is the *sanction* for stipends and honorariums to scholars and learned men.

The above lines suggest a sort of literary pensions granted to qualified men to enable them to devote their whole time and energy to the pursuit of their special investigations. Here is a plea for the adoption of the policy of *Protection* for fostering the national literature, arts and sciences. A state without men of letters is insignificant and unimportant. Hence one of the functions of the state is the direct promotion and encouragement of culture among the people.

[3] बहुसाध्यानि—Which have many ends, hence highly complicated state functions, perhaps of great diplomatic importance.

[1]254-255. There is no letter (of alphabet) which bears no charm, there is no root (of plants) that possesses no medicinal properties. So also there is no man who is (utterly) unfit. But the rarity is the person who can connect.

256-258. The man who knows of the various species of elephants, *e.g.*, *Prabhadra*, *Airâvata*, *Pundarîka*, etc., their treatment, the methods of training them, their diseases, the art of nourishing them; who can discover and distinguish their qualities by studying the roof of the mouth, the tongue, and the nails, who knows how to climb them and guide their movements, should be appointed to take care of elephants.

259. The guide with such qualifications is sure to captivate the heart of the elephant (is sure to master its passions).

[2]260-263. The man who knows of the feelings of horses, and can discover and distinguish their qualities by studying their species, colour and movements, who knows how to guide, train and treat them, and is aware of their mettle, spirit and diseases, who knows what is good and what is bad nourishment for them, who knows of their weight, their capacity for bearing weights, their teeth and their age, who besides is valorous, adept in military parades and is wise, should be appointed to the superintendentship of horses.

[3]264-267. The man who has all these qualifications and besides knows of the yoke and the burden, who knows of the strength of chariots,

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[1] *Śukrâchâryya* has been dilating on the skill and discrimination required of the master for the selection of proper men for tasks for which they are fit. These two lines contain the general truth that there is nothing in the world that is absolutely useless. Everything has its own use.—The greatest difficulty is to find out the man who can make proper use of these things in the universe, create *mantras* by connecting the letters of the alphabet, discover medicines by finding out the relation of plants with human bodies.

The kernel of truth that *Śukranîti* establishes for the success of organisations, and what all responsible men should regard as the first principle is the maxim, 'Give each man his proper work.' योजक—the combiner, connecter, the man who can discover the relations existing between bodies, and hence the effects of various sets of juxtapositions.

[2] Śukrâchâryya's statement of qualifications for the Superintendents of horses and elephants contains, as it should, a knowledge of practical zoology and veterinary science. And as the two animals differ in many respects both as regards physique, movements and habits, it is easy to see why the two offices should be kept separate. A good groom is not likely to be a good tender of elephants.

[3] The master of chariots must have not only all the qualifications of keepers of horses, but the additional merits of discriminating the qualities of wood and other materials used in the building of chariot so that he might be confident of the strength of his vehicle; and he must also be skilled in the mechanical movements required for manipulating it.

सनापतत्, &c.—Destroyer of the mark fixed for the attacking missiles.

and is skilled in moving, rotating and turning them about, who by movements of chariots can frustrate the aims (of enemies marked by missiles and weapons, and who knows how to fasten and protect the horses should be appointed as master of chariots.

268-269. Those are to be made grooms of horses who are brave, versed in military parades and battle arrays and know of the movements of horses, who are intelligent and know the art of warfare with arms and weapons.

270-273. The trainer of horses is he who knows of the eleven kinds of horses' movements such as : (1) circular, (2) galloping, (3) prancing, (4) trotting, (5) jumping, (6) speedy, (7) slow, (8) tortuous, (9) serpentine, (10) *rolling*, revolving, and (11) galloping at full speed ; and who can 'break' them according to their strength and according to the uses to which they would be put.

[1]274-275. The man who can serve the horses well, who knows how to place the saddles, etc., and who is able-bodied and brave should be made a groom.

[2]276-280. Those who are well up in *Nītiśāstras*, the use of arms and ammunitions, manipulations of battle arrays, and the art of management and discipline, who are not too young but of middle age, who are brave, self-controlled, able-bodied, always mindful of their own duties, devoted to their masters and haters of enemies should be made commanders and soldiers whether they are Śūdras or Kṣatriyas, Vaiśyas or descended from Mlechchhas.

[3]281-285. There should be appointed a head over five or six foot-soldiers. Such an officer is called *Pattipāla*. The *Gaulmika* is the head of thirty foot-soldiers. The *Śatānīka* is the head of one hundred foot-soldiers. The *Anuśatika* is the head of one hundred foot-soldiers. There should be an officer over one thousand and an officer over ten thousand troops.

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[1] [illegible]—Saddle.

[2] नति—Discipline, rules of etiquotte. The Military Department must follow these rules and ceremonials very punctiliously. Hence only well disciplined men can be taken into the army.

L. 279—There is no caste in and for military organisations. The army may be recruited from any caste.

[3] Ranks of the army :—

पत्तिपाल—head of 5 or 6 infantry.
गौल्मिक—Head of 30 „
शतानीक—Head of 100 „

अनुशतिक—Head of 100 infantry.
साहस्रिक—Head of 1,000 „
आयुतिक—Head of 10,000 „

[1]286-287. The man who trains the soldiers in the morning and in the evening in military parades, and who knows the art of warfare as well as the characteristics of battle-fields is the *Śatânîka.*

288. The *Anuśatika* who has these qualifications is a help to the *Śatânîka.*

[2]289-290. The *Senânî* is he who knows of the military necessaries, contingencies, and the battleworthy soldiers and appoints functions to the guards and sentinels.

291-292. The *pattipa* is he who conducts the rotation of watchmen on duty at night. And *gulmapa* knows carefully those on night duty.

[3]293-294. The *Lekhaka* (clerk) is he who knows how many soldiers are there, how much salary has been received by them, where the old soldiers have gone.

295. The master of twenty elephants or of twenty horses is known as the *Nâyaka.*

296. The king should mark the above-mentioned officers with appropriate uniforms.

297-298. Those men are to be masters of goat, sheep, cows, buffaloes, deer, etc., who are skilful in tending and nourishing them and who have love for these animals.

299. Of like qualifications there should be appointed men to serve elephants, camels, &c.

300-302. They are also of warlike dispositions, domesticators of *titira* birds, and good teachers of parrots, and know when *syena* birds fall victims to arrows as well as the inward feelings of these animals.

303-304. That man is to be in charge of gold, jewels, silver and coins who can distinguish their values by their weight, shape, lustre, colour, and resemblances.

305-306. The man who is self-controlled, possesses wealth, knows the arts of politics, considers riches as valuable as life and is very miserly is to be the Treasurer.

307-308. That man is to be in charge of clothing who can distinguish the values of woollen and silken clothes by studying the places of origin, the nature of men who have woven them, the fineness and roughness of texture, as well as the durability or otherwise of the fabrics.

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[1] Parades were held twice every day under the supervision of the head of 100 soldiers.

[2] The *Senânî* is thus like *Anuśatika* an assistant to *Śatânîka*. He is in charge of the commissariat, general health and comfort of the troops under the *Śatânîka*, something like a civil attendant of the troops.

[3] लेखक—The officer in charge of all facts and figures. He can supply statistics and news about the Military Department.

309-312. That man is to be Superintendent of tents and furniture, etc., who knows the methods of dyeing, laying out beds, fitting camps, and arrangements of clothes.

313-314. That man is to be the Superintendent of the granary who knows of the species, measurements, values, essential characteristics of the grains, as well as the methods of consuming, collecting and cleansing them.

315-316. The Kitchen Superintendent is he who can distinguish the washed from non-washed food substances, and can distinguish the mixtures and varieties of tastes, who is skilled in the culinary arts and who knows of the attributes of substances.

[1]317-319. The Superintendent of parks and forests is he who knows of the causes of growth and development of flowers and fruits, who knows how to plant and cure the trees by administering proper soil and water at the suitable time, and who knows of their medicinal properties.

[2]320-324. That man is to be the Supervisor of buildings and palaces who can construct palaces, ditches, forts, ramparts, images, machines, and bridges, who can dig wells, lakes, tanks, and can build artificial fountains and pumps for discharging water upwards,—all this very finely according to canons of fine Arts.

[3]325-326. That man is said to be in charge of the household who knows fully of the requisites of the king and collects the things at the proper time.

327-328. That man should be appointed to the post of superintending the religious establishments and institutions who is mindful of his own duty in life, always devoted to religious practices and has no greed and hankering.

329-332. The Superintendent of charities is to be that person who does not disappoint the beggar, does not amass wealth, who is charitable, has no greed, can detect the merits of others, is not slothful, who is kind, *gentle in words, knows the proper objects of charity and is very humble.*

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[1] आरामाधिपति—Corresponds to Superintendents of Botanical Gardens of modern times.

[2] The qualifications described here are those of the Civil Engineer. In modern times also the officer in charge of Public Works must be a Civil Engineer.

[3] सम्भार—Commodities.

This officer is something like a butler who ministers to the daily wants of the household and keeps things in order.

333-336. Those who are versed in the arts of politics, have intelligence and are men of good deeds, habits and attributes, who are inpartial to friends and foes alike, religious-minded and truthful, who are not slothful, who have conquered the passions of anger, lust and cupidity, who are gentle in speech and old in age should be made members of Council irrespective of caste.

337-338. That man is to be appointed head of hostels and inns for strangers who looks upon all beings as self, who has no hankering and has respect for guests, and who is always charitable.

339-340. The examiner should be he who is devoted to the good of others, who does not divulge other's secrets, who bears no hatred and who appreciates merits of others.

341-342. The chief is he who inflicts punishments in such a way as not to annihilate the subjects and who is neither too cruel nor too lenient.

343-344. The head of the village, like the father and the mother, protects the people from aggressors, thieves and also from officers.

[1]345-346. The gardener collects flowers and fruits after having duly nourished the trees with care. The collector of taxes is to be like him.

[2]347-348. The clerk is to be he who has skill in accounts, who knows of the differences between countries and languages, and who can write without hesitation and without vagueness.

349-350. The sentinel or news-bearer is to be well up in the use of arms and weapons, able-bodied, active in habits, and humble in responding appropriately (to orders).

[3]351-352. That man is a good collector of taxes and duties who realises these from shop-keepers in such a way as not to destroy their capital.

353-354. That man is said to be practising penances who takes regular fasts, systematically observes the rules, regulations and rites of religious life, is bent on meditation, self-controlled, merciful and uncovetous.

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[1] The principle of Taxation is suggested by the art of the gardener who deprives the trees of their products but not of their life. Taxation is a painful necessity but must not be heavy enough to kill the people.

[2] The लेखक must be proficient in Mathematics, History, Geography and Language.

[3] Both as regards शुल्क (*i.e.*, duties or taxes on goods) and भाग (revenue from land) the principle of collection is the same—*viz.*, not to destroy the productive capacity altogether.

355-356. That man is charitable who gives away wealth, wife and sons to those who beg for those and who takes nothing (in return).

357-358. They are known to be *Srutajna* or learned men who can read and teach (the Śrutis, Smṛitis, and the Purâṇas), who have studious habits.

[1]359-360. That man is Paurânika who is master of literature, knows music, has a good voice and is well up in the five aspects of Purâṇas.

[2]361-362. That man is said to be versed in Śâstras who is master of *Mîmâṃsâ*, *Tarka*, *Vedânta*, and authority as evidence, who knows where to place which word and who can ably explain matters to others.

363-364. That man is an astrologer who knows the Saṃhita, Science of Time, Mathematics, and who is aware of the past, present and future conditions of men.

365-366. That man is a *Mântrika* (magician or charmer) who can discover merits and demerits by reciting hymns or incantations according to a certain order, who is devoted to hymns and incantations and who has influence with the spirits.

367-368. That man is known to be a physician who can discover the real nature of diseases by studying their causes, symptoms and remedies, and who attempts prescriptions after knowing them to be curable or incurable.

369-370. That man is a *Tântrika* or an observer of the *Tantras* who tries to propitiate the gods by hymns and mantras other than those of *Srutis* and *Smṛitis* on the conviction that the procedure would do good to him.

371-372. Those who are sexless, who are truthful, sweet-tongued, come of respectable families and are of beautiful forms, should be appointed in the inner apartments.

373-376. The maid-servants are to be those who are faithful to their husbands, practise religious rites and who are able-bodied, not young but middle-aged, skilled in serving, and who are ever ready to do all works however humble.

377-378. They are to be appointed as secret spies who are adepts in understanding the activities of enemies, subjects and servants and who can faithfully reproduce what they hear.

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[1] **सर्गादि – The 5 aspects or characteristics of Purâṇâs. (1) सर्ग (Creation). (2) प्रतिसर्ग (Destruction. (3) वंश Dynasties. (4) मन्वन्तर (Epochs). (5) वंशानुचरित (Deeds of dynasties). The Purâṇas treat of these 5 topics.**

[2] **शब्दवान – Skilled in the proper use of words,**

[1]379-380. The *Vetradharas* are to be those men with arms who can teach people coming to the presence of the king the methods of salutation, etc., as well as the seats they should take.

(?) 381-384. He is the head of the musicians who knows and can produce the seven notes, who knows how to sing in union with music or dance or beat.

385-387. These lines describe the concubines.

388-389. Other servants who can please their master's heart by their work should also be appointed by the king for his own welfare (and satisfaction).

[2]390-392. (Among such attendants are) the songsters who awaken the king in the morning by their music, poets, guards of honour, artisans and artists, fools, ventriloquists, dancers and harlequins, who are always useful.

393-394. Those who construct parks, artificial forests and pleasure-gardens, builders of forts, (gunners) who can pierce the objects they aim at by the balls thrown out of big cannons.

[3]395-396. Those who make lighter machines, gunpowder, arrows, cannon-balls, and swords, and construct various tools and implements, arms and weapons, bows and quivers, &c.

[4]397-398. Those who prepare ornaments of gold, jewels, &c., builders of chariots, stone cutters, blacksmiths and those who enamel metals.

[5]399-400. Potters, coppersmiths, carpenters, roadmakers, barbers, washers, and those who carry nightsoil.

[6]401. Messengers, tailors and bearers of royal emblems and ensigns.

402-403. Those who by the sound of trumpets, drums, conches, pipes, &c., can construct battle arrays, and

404-405. Sailors, miners, fowlers, menials and coolies, repairers of implements, and those who

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[1] These men are masters of high class etiquette.

[2] Here follows an enumeration of the various crafts and industries that, according to *Śukráchâryya*, should be rightly encouraged. Here is, in short, a picture of the socio-economic life of the age of Śukranîti.

[3] The military industry is described in these 3 lines.

[4] Industries connected with wood, stones, metals and minerals are enumerated here.

[5] The humbler industries are enumerated here.

शौल्विक—Coppersmith.

तक्षक—Carpenter.

[6] सौचिक—Tailor.

406-407. Shop-keepers, prostitutes, those who live upon the musical instruments and their wives, weavers, bird-catchers, artists and leather-merchants.

408-409. Those who repair and cleanse houses, utensils and clothes and winnow grains, those who know how to spread beds and fit out tents, as well as governors(?).

410-411. Those who prepare fragrant resins, and who are skilled in the preparation of betels—all these humble and low workers have to be appointed to their proper works.

412-413. Truth and philanthropy are the two most sacred of all virtues. The king should always have servants having these qualities.

414-415. Envy is the greatest of all sins, mendacity is greater than envy. The king should not have servants having these vices.

416-417. The good servant is he who knows when what is to be said or done and does or says that at the proper time.

418-419. The servant should get up during the last three hours of the night, consider the duties to be performed during the day, ease himself of excreta, remember Vishnu and then have his bath.

420-421. Then he should finish his morning prayers within half a *muhûrta*, go to his place of work and study what should be done and what not.

422-423. Standing at the gate he should obstruct anybody who enters without permission, but let him in when after informing the king he has been ordered to do so.

424-425. The mace-bearer having seen that people have come into the council-room, should communicate to the king their salutations and then point out their seats.

426-427. Then he should go into the palace, and if ordered, come before the king bowing down to him as to the second self of Vishnu.

428-429. He should fix his eyes on half of the master's seat and not cast them anywhere else.

430-431. He should approach the king as a burning fire; the master who is lord of life and wealth is, as it were, a snake infuriated.

432-434. He should ever serve him with care and never consider himself to be anything. He should take up his side and speak sweet words or speak clearly and distinctly when asked by him.

[1]435-436. In disputes or discussions which involve easy problems even if he knows of the opinions of the parties, he should not say anything.

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[1] गोष्ठी—Clubs, associations, here discussions, &c.

437-439. He should always be moderate in dress, and when called by the king, with folded hands and bent head, hear what he says. Then having obeyed his command he should inform his own actions.

440. Having bowed down to the king one should take his seat either on the side or in the front according to instruction.

441-442. He should not indulge in loud laughter or coughing, should desist from spitting, abusing, yawning, stretching the limbs as well as relieving the joints of the body.

443-444. He should sit with pleasure at the place where he has been ordered by the king, and give up vanity though he be old and wise.

445-446. The well-wisher should say good words even when unasked if there be some danger, or if there be something wrong in the affairs or if the time appointed for some action is seen to be expiring.

447-448. He should say what is pleasant, true, useful and virtuous, and always explain to him what is his good on terms of equality.

449. He should describe the fame of other kings and narrate the effects of virtuous life.

[1]450-451. "O king, thou art charitable, virtuous, and valorous and livest a moral life. There exists no immoral feeling in your mind."

452-453. He should always mention before him the persons who have been ruined through immorality.

[2]454. 'Thou art superior to kings'—This should be said but superiority to all must not be mentioned.

[3]455-456. The man who is aware of the conditions of time and place always serves the interests of others according to the circumstances (presented before him). He should always say therefore to kings in a manner that does not do harm to others.

457. He should never destroy the interests of the subjects.

458-459. Starved by hunger the Pandit should rather rest even as a dry pillar but he should never resort to means of livelihood that are attended with disrepute.

460. One should be mindful of those activities with which he has been entrusted. One should not desire the rights of another, nor should he envy anybody.

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[1] This is to be the burden of remarks made to the king by visitors.

[2] This is a warning against exaggeration. The king should hear what might encourage him but not what is downright flattery.

[3] Thus the praise that this king is better than many kings is vague and cannot detract from the proper reputation of any specified ruler.

461-462. One should not mark the defects of others but try to remove them as far as possible. There is nothing more efficacious for creating friends than philanthropy.

463-464. One should not put off an action in the wish that 'I shall do your work afterwards,' but should proceed with it at once if possible without keeping it over for long on hope.

465-466. One should not divulge the secret actions or policies of the master—and should never even reflect in mind on envy and ruin about him.

467. One should not glibly consider the king to be one's intimate friend.

468-469. One should give up companionship, intercourse and association with women, hangers-on, vicious men, enemies and those who have been forsaken.

470. One should not imitate the dress and language of the king.

471. Even if one is well-to-do and intelligent, one should not pride in these.

472-473. The skilful man should note the pleasure and displeasure of the king, by studying his inward feelings, outward expressions and movements.

474. He should leave the king when displeased, but should humour him when satisfied.

475-476. During displeasure the king causes one's destruction and the prosperity of the enemy, and by giving rise to hopes, frustrates the fruits.

477-478. Even without anger he looks as if he were angry; and even though looking satisfied, he does no good for he speaks words feelingly but cuts off the grants.

479-480. He faces contrariwise if his virtues are narrated, and he looks to other sides if some work is being done.

481. These are the signs of displeasure. Now I mention the signs of pleasure.

482-483. He is pleased at the sight, hears what one has to say with eagerness, inquires about health and provides seats.

484-485. He does not fear interviewing him in secret, and is known to be well pleased with hearing words of or about him.

486-487. He appreciates even unpleasant remarks coming from him, and accepts his presents though small in amount.

488-489. He remembers him during conversation. These are the marks of royal pleasure. Service should be rendered to him.

490-491. One should always put on the clothes, uniforms and emblems granted by the king, and ever communicate to him the excess or deficit in one's jurisdiction.

492. He should hear of or narrate the stories relating to him.

493-494. If through the fault of spies and secret officers the king says anything wrong, one should hear that in silence but not accept it as a truth.

495. One should never desert a good master who has fallen into distress.

[1]496-497. One should daily wish for the good of him whose food he has taken even once in life. Should not that of the Protector be wished for always?

498-499. The subordinate may become the chief in time through constant service. The chief may also become subordinate through idleness in service.

500-501. The man who is ever serviceable soon becomes the king's favourite. He performs gladly the work that belongs to his jurisdiction.

502. One should not do mean works, and the king should not also order for such.

503-504. But in the absence of one who is to do that work, the king's order should be obeyed. For even superior men have to do inferior works which become duties in time.

505-506. One should not desire harm for one with whom the king is pleased, nor should display the greatness of one's own functions.

507-508. The officers should not envy one another, nor should they ever get into conflicts. For the officers have been appointed by the king each to his own post.

509-510. Where the officers and the king both are in good order there wealth is permanent, extensive and available.

511-512. The king should not express the deeds of another officer though he has heard of them nor should he hear of them through some other source.

513-514. Those officers who do not explain what is good and what is harmful to the king are really his secret enemies in the form of servants.

515-516. The king who does not listen to the counsels of ministers about things good and bad to him is a thief in the form of a ruler, an exploiter of the people's wealth.

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[1] The two lines teach gratefulness to hosts and kings.

517-518. Those ministers who in concert with princes militate against the king (?) are secret thieves.

519-520. Princes, even if young, should not be disregarded by ministers, but should always be carefully addressed in respectful terms.

521-522. One should never point out the defects of their character to the king. For love of wife and children is very great, their slander is not likely to do good.

523-526. 'I am sure to accomplish first what is absolutely necessary for the king even though at the risk of life. Please command me'—Thus saying one should at once proceed with the work according to one's ability. And one should sacrifice his life even for great deeds and for kings.

527-528. The servant is for maintaining his kith and kin, never for other purposes. All servants exploit wealth, while the king takes life.

529-530. The king takes the life of servants in warfare and other great deeds. And the servant takes away the wealth of the king in the form of wages.

[1]531. If they take otherwise they become destroyers of themselves.

532-533. The king with the princes is always to be respected by *Amâtyas* and other ministers. Below them in respectability comes the order of nine ministers, next the army of officers.

534. The commander of ten thousand infantry is to be respected like the ministers. The commander of one thousand is slightly lower.

535. One should not play like the king, and should encourage him while at play.

536. The queen as well as daughters are not to be disrespected by the ministers.

537. The relatives of the king as well as their friends have to be duly respected.

538. When called by the king one should come immediately to him leaving thousand important actions.

539. One should not express even to a friend the well-considered deeds of kings.

540-541. One should not desire anything more than the salary that is not given and should not want salary in the course of the work.

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[1] Both king and servant are thieves in their own ways, by their very functions. So that taking of life and of wealth is legitimate in the two cases. अन्यथा etc. Deviation from these would lead to tyranny and robbery

—Thus if the king kills men in ordinary times he becomes an arbitrary ruler who is soon likely to be overthrown. And if the servants break open the coffers of the state they will be treated as robbers and will have to rot in the jail.

542. One should not destroy the interests of others through greed.

543. One should protect the king by one's own wife, children and wealth at the proper time.

544. One should not receive bribes nor should explain things to the king wrongly.

545-546. One should advise the king for his benefit in some secret place when he is found to be an oppressor and punisher without rhyme or reason.

547. One should not do anything that is good to the king but is harmful to the people.

548. Thus new taxes and duties are vexatious to the people.

[1]549-550. If the king be an enemy of virtue, morality and strength, people should desert him as the ruiner of the state.

551-552. In his place for the maintenance of the state the priest with the consent of the *Prakriti, i.e.*, ministers should install one who belongs to his family and is qualified.

553-554. The man who carries on *astra, i.e.*, missile, should sit at a place beyond the range of the weapon, the man who carries a *sastra, i.e.*, an arm, at a distance of ten cubits, and king's friends where instructed.

555. Ministers and clerks should always sit at a distance of five cubits.

556. The king should not enter the assembly without commanders and without full armour.

557-561. The commander is of a high grade, but the priest is of a superior order; friends and relatives are of the same order. Ministers have a very high status. The officers have a middle position. The audience and clerks are of a low status. The servants and attendants are of the lowest rank. But even lower than these are the menials.

562-564. In receiving the priest and ministers the king should cheerfully get up from his seat, come before them, offer them seats and inquire about their health, &c.

565. In the case of the officers he should sit gracefully.

566-567. The king should have three characters—that of the autumn moon to the learned people, that of the summer sun to the enemies, and that of the spring sun to the subjects.

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[1] Expulsion of the king recommended when he is an enemy of the state.

568-569. If to people below the rank of Brahmans the king should behave with leniency, these lower orders would overpower him just as the elephant-catchers master elephants.

570-571. The king should not indulge in jokes or sports with the servants. These cause insult to kings and are dangerous to them.

572-573. These lower orders approach the king separately for their self-interest after finishing their work well, for all are selfish.

574-575. They frustrate, disregard and contradict the king's instructions, eat the royal food, do not stay at their own functions.

576-577. They divulge his secrets and make public his bad actions, put on the dress of the king and always deceive him.

578-579. They decorate their wives and laugh when the king is angry, behave shamelessly and disregard the king in a moment.

580. They disobey his orders and do not fear to do misdeeds.

581. These are the defects due to jokes and sports indulged in by the king with men of lower orders.

582-583. The officer or servant is not to do anything without the king's written order. Nor should the king command anything great or small without written order.

584. A written document is the best guide, for to err is human.

585-586. Both the king who commands without writing and the officer who does anything without written orders are thieves.

[1]587. The written document with the king's seal is the real king. The king is not a king.

588-590. The best is the document which bears the king's seal and handwriting. The document written by the king is of a good validity, while that prepared by ministers is tolerable. That written by the citizens is inferior. But all are valid.

[2]591-594. *Amâtyas*, princes and officers who have been entrusted by the king with responsibilities should submit written reports of their work once a day, once a month, once a year or once during many years.

595-596. The officers should keep a memorandum or precis of written orders passed by the king, for with time men forget or mistake past things.

597-598. In ancient times writing was created by *Brahmâ* to remind what happened as the symbol or representative of vocal sounds and tones.

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[1] **Here is an abstract conception worthy of the most recent times. The royal seal is the real king, not the person.**

[2] **Each department to furnish daily, monthly, yearly, quinquennial reports, &c.**

599-600. Documents are of two kinds—for describing works or deeds and for keeping accounts of income and expenditure. Each, however, has been greatly diversified through varieties of usage and practice.

[1]601-602. A *jaya patra* or a document of judgment is one that contains an account of the case or suit brought forward, arguments for and against, and also the decision.

603-604. An *ájñá patra* or document of order is one by which functions are entrusted to tributary chiefs, officers or governors of districts.

605-606. A *prajñá patra* or document of notification is that by which priests, sacrificers, worshippers and other venerable men are informed of the rites they have to perform.

607-608. A *śásana patra* or a document of public notice and regulations for the people is that which contains the king's own signature and date and begins in the following way: "Hear ye all, or Notice is hereby given that, etc., such and such things must be done by you, etc."

609-610. A *prasâd patra* or document of pleasure is that by which the king confers lands, etc., on persons satisfied with their services, valour, etc.

[2]611-612. *Bhoga patra* or the documents giving right to enjoyment, the document giving right to the tribute, and the document giving right to presents or privileges may be for generations or for certain stated periods.

613-614. The brothers and relatives who have voluntarily separated themselves from one another frame a document describing the partition. That is called *bhâgalekhya* or partition deed.

[3]615-616. One should frame a document after giving away or bequeathing houses, lands, etc. That is called *dána patra* or deed of gift which is indestructible and cannot be received back.

617-618. That document is called a deed of sale or purchase which contains an account of the measurements, values and witnesses of the dealings in houses and lands.

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[1] **साध्यार्थं—Matters in dispute, the suit.**

अवधारण—Decision, judgment.

[2] **भोगपत्र—Gifts.**

करदीकृत—Grants of tribute.

उपायनीकृत—Charters of privileges.

उपायन—Present.

[3] **अनुच्छेद्यं—Which cannot be destroyed.**

अनाहार्यं—Which cannot be brought back.

[1]619-620. A *sâdi patra* is that document which contains an account of the things pledged, values received and witnesses in the matter of a transaction which involves the pawn or pledge of movables or immovables.

621-622. A *satya lekhya* is that agreement which two townships make between themselves while the *samvit patra* is the treaty between two kings to observe dharma without fighting with one another.

623-624. A *ṛina lekhya* or document of loan is known to be that which contains an account of the witnesses and is framed on the receipt of some money at interest.

625-626. A *śuddhi patra* or document of purgation is that which contains an account of witnesses and is framed after some curse has been worked out or a penance has been duly performed.

[2]627-628. A *sâmayika patra* or business deed is one which individuals frame after combining their shares of capital for some business concern.

629-630. A document which has not been executed by an assessor or an official or a member of the Court and which is admitted by the opposite party is said to be a deed of compromise.

631-632. The letters that are written to know of each other's works and circumstances should begin with words of blessing and grace and contain reference or reply to previous affairs.

633-634. They should not be vague, and mysterious, but be distinct in letters and words, and should contain the names of themselves and their parents.

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[1] सादिलेख्य—Receipt for a pawn in lieu of certain things placed under certain conditions as to time, use, etc.

[2] मेलयित्वा—Joint-stock companies formed by the combinations of shares स्वधनांश for certain व्यवहार—(commercial transactions).

साधकाः—Individual shareholders who want to co-operate and form a company.

[3] The various kinds of business and legal documents enumerated in these lines :—

(1) जयपत्र—Sentence or judgment.
(2) आज्ञापत्र—Order.
(3) प्रज्ञापनपत्र—Instructions to priests, etc.
(4) शासनपत्र—Public Notification.
(5) प्रसादपत्र—Gifts.
(6) भोगपत्र—Enjoyment, usufruct.
(7) भागपत्र—Partition.
(8) दानपत्र—Gifts.
(9) क्रयपत्र—Sale or Purchase.
(10) सादिपत्र—Security or pawn.
(11) सत्यलेख्य—As explained above.
(12) संवितपत्र—Treaty.
(13) ऋणपत्र—Loan.
(14) शुद्धिपत्र—Purification.
(15) सामयिकपत्र—Combined action for commercial purposes

635-636. These should be duly attended with the words of respect in singular, dual or plural number and marked with the year, month, fortnight, day, name and caste of the writers.

637-638. A *kshema patra* is that which begins with obeisance or blessing, which fully explains the affairs and is systematic and is meant for master, servant or those who are to be served.

639-640. That which contains all these characteristics and describes an attack upon oneself or refers to some pain suffered is called *bhâshâpatra.*

[1]641-642. Thus have been mentioned in brief the various documents describing deeds or actions together with the characteristic features of each. Now is being described the other class of writings by which account of receipts and disbursements are kept.

[2]643-644. The documents for keeping accounts are of various kinds and designated under different names according to the differences in amount great or small, values and measurements.

[3]645-646. An income denotes the bringing under possession gold, cattle, grains, etc., annually, monthly or daily.

647. An expenditure denotes the giving away of possession of wealth to others.

648. Income may be new as well as old.

[4]649. Expenditure is of two kinds—for enjoyment or for exchange.

650-651. Accumulated wealth is of three kinds, that whose proprietary rights are known to belong to others, that whose owners are not known, and that which is surely one's own.

[5]652. That wealth, the proprietary rights of which belong to others, *i.e.*, the first class of accumulated wealth is, again, of three kinds, that which has been kept as pawn or security by others, that which has been realised by begging, and that which has been collected through loan.

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[1] Besides the 15 classes of हस्तलेख्य mentioned above some others have been enumerated in ll. 631-41. The first may be described as official, business or legal. The others which are of a private nature are:—

(1) क्षेमपत्र

(2) भाषापत्र

[2] व्याप्य—Small.

व्यापक—Many.

[3] Three characteristics of आय—

(1) Commodities.

(2) Possession.

(3) Period of realisation.

[4] 'Consumption,' as the modern economic category is, may be direct as well as indirect. It may be for future production and involve only an exchange of goods.

[5] In modern Public Finance also Debts are shown on the Assets side.

[1]653-655. *Aupanidhika* wealth is that which has been placed with one by good people through confidence. *Yâchita* wealth is that which has been collected without any consideration of interest, *e.g.*, ornaments, &c., while *Auttamarṇika* wealth is that which is borrowed at some interest.

656-657. That wealth whose owners are unknown (*i.e.*, the second class of accumulated wealth) is illustrated by gems and jewels picked up in streets.

[2]658. That wealth which surely belongs to oneself (*i.e.*, the third class of accumulated wealth) is again, of two kinds, normal and artificial.

659-661. That income is said to be normal which grows regularly by days, months or years.

[3]662-664. Profits of sale, interest, wealth realised by services rendered, rewards, remuneration, wealth conquered, &c., all these constitute *adhika* (increase) class of one's own wealth. All else is normal.

665. Accumulated wealth is of two classes, last year's surplus or balance and the current year's receipts.

[4]666-667. Each of *adhika* and *sâhajika* or normal, *i.e.*, each of both the classes of one's own wealth is again of two kinds, *pârthiva* (territorial) and *non-pârthiva*.

668-670. *Pârthiva* income is that which comes of land of the earth. That again is various owing to various sources, *e.g.*, natural waters, artificial waters, villages and cities.

Income from the land is again divided into various classes owing to the divisions of land and great, small or medium amounts.

[5]671-672. The duties, fines, royalties on mines, presents and

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[1] Both the last two species of receipts have to be paid back. But there is an interest in one case while the other is gratuitous or friendly help.

[2] साहजिक—Naturally accruing, normal.

अधिक—Increase (profits) from business, &c.

[3] The अधिक class would be what is known as quasi-economic receipts of states in *modern times, i.e., revenues accruing not from the normal functions of the state as a political organisation, but from those of the state* as a business concern, owner of property, capitalist, &c.

[4] पार्थिव—Pertaining to the earth, land, soils, &c.

[5] भाटक—Wages, price paid for the use of any thing.

The schedule of income as described in the above lines is given below:—

I. निश्चितान्यस्वामिकं—Belonging to others.

(1) औपनिध्य—Pawn placed by others as deposit.

(2) याचितक—Begged, *e.g.*, ornaments, &c.

(3) औत्तमर्णिक—Loan.

II. अज्ञातस्वामिक—Whose owners are unknown, *e.g.*, things picked up in streets, which escheat to the state.

contributions, &c., are known to constitute non-territorial income according to writers and specialists.

673. Expenditure is named after the purpose for which wealth has been realised.

674. Expenditure also can be both great and small.

675. Expenditure falls into two heads—that which will come back, and that which destroys the right for ever.

676-677. That disbursement is said to be *âbṛitta, i.e.*, to have the attribute of being able to come back which is hoarded, deposited with others, exchanged, or lent to debtors with or without interest.

678-681. *Nidhi* is that which is hidden underground, *upanidhi* is that which is placed with others as deposit. That is said to *vinimayîkṛita* or exchanged which is received on payment of some price. That is said to be *âdhamarṇika* which is given to others with or without an increase. Of these that with interest is called a loan or *Ṛiṇa*, that without interest is called *yâchita* or got by begging.

682. That which does away with proprietary right is of two kinds, worldly and other-worldly.

683-684. *Aihika* or worldly disbursement is divided into four classes—price or return of value, reward, salary and food (and other necessaries). *Pâralaukika* or other-worldly disbursement (is innumerable and) admits of infinite divisions.

686-688. *Pratidâna* is known to be that which is paid by way of price. *Pâritoṣika* is that which is paid as reward for service, valour, etc. *Vetana* is that which is paid as salary or wages.

689-691. *Upabhogya* is said to be that which is paid for grains, clothing, houses, parks, cattle, elephants, chariots, etc., acquisition of learning, kingdoms, wealth as well as for protection.

III. **स्वस्वत्व—One's own property :—**
- **(1) साहजिक—Normal, accruing to the state as a political organisation :**
  - **(*a*) पार्थिव—Terrestrial—coming from the *rights of sovereignty* over lands, rivers, seas, lakes, tanks, wells, &c.**
  - **(*b*) इतर—Non-terrestrial—taxes, duties, fines, presents, royalties, prices.**
- **(2) आधिक—Increase—*quasi-economic* or semi-private receipts—(i) Profits, (ii) Interest, (iii) Fees, (iv) Rewards, (v) Salary, (vi) Booty.**
  - **(*a*) पार्थिव—Accruing from *dealings* in lands, waters, &c.**
  - **(*b*) इतर—Income from dealings in taxes, fines, &c,**

692-696. Houses are meant for *gold, jewels,* **silver, coins, etc.,** musical instruments, arms and weapons, clothes, grains and other necessaries, ministers, arts, play, physician, cattle, cooking and birds. Expenditure on these items is called *bhogya.*

697. *Pâralaukika* expenditure is of four classes—that for penances, sacrifices, worship and charity.

699-701. Both income and expenditure are of two classes, *âvartaka* and *nivarti.*

702-703. The accountant or scribe who keeps accounts of income and expenditure should part with goods after writing and receive goods after writing in such a way as not to cause diminution or increase in amount.

704-706. Incomes and expenditures are of various kinds owing to the varieties of source, amount, relation, as well as measurement, number, and weight.

707-708. For business purposes experts desire sometimes the number, sometimes the weight as methods of measurement.

709-710. A *Mâna* is known to be the standard of the *añgula, Unmâna* is known to be the standard of the balance, *Parimâṇa* is the standard of vessels. *Saṃkhyâ* is the standard of numerical notation one, two, &c.

711. One should use these standards according to the needs of each case.

712-713. *Drabya* or goods is silver, gold, copper, coined for commercial purposes, *cowries* and gems for use.

714. *Dhana* or wealth is cattle, grains, clothes and grass.

715-716. Gold which belongs to ownself acquires a value in commercial transactions and an object comes into existence on this earth through the concurrence of several causes.

717. The *mûlya* of a commodity is the price paid for acquiring it.

[1]718-719. Prices of commodities are high or low according as they are attainable with or without ease and according as they do or do not possess attributes.

720-721. One should not fix a low price for gems and minerals. Their depreciation is due to wickedness of kings.

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[1] In determining the value or price of a commodity two points are to be noticed—(1) सुलभासुलभ—Ease or difficulty of attainment—referring to the cost of production determining the supply, (2) अगुणतागुणसंश्रय,—Its utility or power of satisfying wants, etc., because of its properties—referring to the demand for it determined by its uses.

729-730. The king after seeing and studying the document should place his handwriting wherever he likes.

731-738. The *Mantri*, Chief Justice, learned adviser as well as the ambassador should write "This document has been written with my consent." The *Amâtya* should write 'Well written is this,' the *Sumantra* then should write 'Well considered.' The *Pradhâna* should write 'True.' The *Pratinidhi* is to write 'It can now be approved.' The Crown-Prince should write 'It should be accepted.' And the Priest is to write 'approved.'

[1]739-740. They should put down their seals over it at the end of the writing. And the king is to write and sign 'accepted.'

741-744. As it is not possible for the king to see fully all details owing to the pressure of work (multiplicity of duties,) the documents are generally to be examined by the Crown-Prince and other advisers who are to write upon it with their seals. And the king should at once write 'Seen.'

745-746. Incomes should be written first, then the disbursements; or incomes towards the left and disbursements towards the right of the page.

747-773. These lines describe the technique of keeping accounts and will not prove interesting to the general readers.

774. Writing has been described in brief which is an aid to men's memory.

775-776. *Gunja*, *Mâsha*, *Karsha*, *Padârdha*, and *Prastha*, each is equivalent to ten times the item preceding it. An *âdhaka* is equivalent to five *prasthas*.

[2]777-778. Eight *âdhakas* constitute one *armana*, twenty *armanas* make one *khârikâ*. These measures differ with countries.

779-780. A vessel five *angulas* deep and four *angulas* wide is known to be the measure of a quarter of *prastha* by specialists.

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[1] Each document is thus to contain the signatures and seals of all the ten *Prakritis* or advisers of the king as well as of the king himself and the Crown-Prince. So that everybody is accountable for the deed.

[2] 10	गुञ्जा	…	…	…	…		
10	माष	…	…	…	…		कर्ष
10	कर्ष						पदार्द्ध
10	पदार्द्ध						प्रस्थ
	प्रस्थ						आढक
8	आढक	…	…	…	…	1	अर्मण
20	अर्मण	…	…	…	…	1	खारिका

781-782. Numbers, either in ascending or descending order are *written from left to right and these being successively multiplied by ten reach up to the numeration called "Parardha" (10^{17}).*

783-787. It is not possible to define number owing to the immensity of time. The lifetime of Brahmâ is said to be two *parârdhas* by the learned—unit, tens, hundreds, thousands, tens of thousands, hundreds of thousands, millions, &c.

788-789. Time is divided according to three systems—Solar movement, Lunar movement and according to *Sâvana.*

789-790. In making payments of wages one should always take the solar time, in augmenting interest one should take the lunar time. And the *Sâvana* system should be followed in [giving] daily wages.

791-792. Remuneration can be paid according to time, work or according to both. It is to be paid therefore as arranged, *i.e.*, according to contract.

793-794. 'This weight is to be carried by you thither, and I shall give you so much for your work.' Remuneration calculated on this system is according to work.

795-796. "Every year, month or day I shall pay you so much." Remuneration calculated on this idea is according to time.

797-798. 'So much work has been done by you in so much time I shall pay you therefore so much.' Remuneration thus calculated is according to both time and work.

799-802. One should neither stop nor postpone payment of salary. Moderate remuneration is said to be that which supplies the indispensable food and clothing. Good wages is that by which food and clothing are adequately supplied. Low wages is that by which only one can be maintained.

803-804. According to the qualifications of the workers there should be the rates of wages fixed by the king carefully for his own welfare.

[1]805-806. Wages is to be so fixed that the worker may maintain those who are his compulsory charges.

[2]807-808. Those servants who get low wages are enemies by nature.

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[1] The equitable rate of wages is that which considers not simply the absolute necessaries of life but recognises the 'standard of life and comfort' as implied in the care for family and dependants.

[2] हीनभृतिका—Political and social effects of low wages. In considering the Labour Question and the rate of wages Sukrâchâryya takes the essentially modern view that low wages is the cause of sundry social and moral evils. And his equitable standard anticipates by centuries the socialistic cries for 'higher life' to be lived by the working classes.

They are auxiliaries to others and seekers of opportunities and plunderers of treasure and people.

809. Wages of Śûdras is to be just enough for food and raiment.

810. The man who maintains meat-eaters is visited with their sin.

811-812. The wealth that is stolen by the Brahman leads to good life hereafter, and the wealth that is given to the Śûdra leads only to hell.

813-814. Servants are of three kinds—inactive, ordinary and quick. Their wages therefore have to be low, ordinary, and high respectively.

815-816. For the discharge of their domestic duties servants should be granted leave for one *yâma* during day time and three *yâmas* by night. And the servant who has been appointed for a day should be allowed for half a *yâma*.

817-818. The king should make them work except on occasions of festivities, but in festivities also if the work be indispensable excepting in any case the days of *Srâddha*.

819-821. He should pay a quarter less than the usual remuneration to the diseased servant, pay three months' wages to the servant who has served for five years; six months' wages to the servant who has been long ill; but not more to anybody.

822-824. Even a slight portion should not be deducted from the full remuneration of a servant who has been ill for half a fortnight. And a substitute should be taken of one who has lived for even one year. And if the diseased be highly qualified he should have half the wages.

825. The king should give the servant fifteen days a year respite from work.

826-827. The king should grant half the wages without work to the man who has passed forty years in his service.

828-829. For life, and to the son if minor and incapable, half the wages, or to the wife and well behaved daughters.

830-831. He should give the servant one-eighth of the salary by way of reward every year, and if the work has been done with exceptional ability one-eighth of the services rendered.

Do these economic theories and conceptions of *Sukraniti* point to the actual economic condition of the age depicted in it? There are other features in the treatise, economic, political and social, which suggest a highly complicated and comparatively modern organisation. It is very likely the Problem of Labour also was acute and Sukrâchâryya had to face those problems which have tried the financial skill and statesmanlike ability of the greatest ministers of states in the ancient city-republics as well as modern empire-states.

832-833. He should give the same salary to the son of the man who died for his work, so *long* as he is a minor, otherwise should pay the remuneration according to the offspring's qualifications.

[1]834-835. He should keep with him (as deposit) one-sixth or one-fourth of the servant's wages, should pay half of that amount or the whole in two or three years.

836-837. The master by harsh words, low wages, severe punishments and insult brings out in the servant the attributes of the enemy.

838-839. Those who are satisfied with wages and honoured by distinctions and pacified by soft words never desert their master.

840-841. The worst servants desire wealth, the medium want both wealth and fame, the best want fame. Reputation is the wealth of the great.

842-843. The king should satisfy both his servants and subjects according to their qualifications, some by spreading out branches, others by giving fruits.

844-845. He should gratify the others by gentle looks and smiles, soft words, good feast and clothes, and betels and wealth ;

846-848. Somebody by inquiries about health, etc., and the grant of privileges, bearers, ornaments and uniforms, umbrellas, *châmar*, &c.

849-852. By mercy, obeisance, respect, attendance, services, knowledge, love, affection, association, offer of half one's seat or the full seat, praise or recital of the deeds done for the good of others.

853-855. He should mark those who have been his employees by the proper insignia of office placed on steel, copper, bronze, silver, gold and jewels.

856-857. For distinguishing from distance he should separate the officers by clothing, crowns, and musical instruments, &c.

858. The king should not give to anybody the uniform that is peculiarly his own.

[2]859-861. Ten advisers have been mentioned beginning with Priest. All of them are of the Brahman caste. In their absence Kshatriyas are to be appointed, Vaiśyas in their absence again but never Śûdras are to be appointed even if they be qualified.

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[1] The idea of establishing a Provident Fund is unmistakably suggested here.

[2] Here is a solution of the difficulty as to how each adviser could be made to take the responsibility of all departments.

862-863. The village head should be appointed a Brahman, the clerk is to be a *Kâyastha*. The tax-collector is a Kshatriya. The lord of *sahasa* is also a Kshatriya.

864. The Collector of duties is a Vaiśya, and the sentinel is of Śûdra caste.

865-866. The Commander is to be a Kshatriya, and in his absence a Brahman. Neither Vaiśya nor Śûdra nor a coward.

867. The Commander is to be valorous and (so) may be selected from all castes.

868. This [fighting] is the duty of the four pure as well as of the mixed castes, although it is not a holy [duty].

869. The king augments the happiness of the caste to which he himself belongs.

870-874. The servant should desert such a king as does not remember good done for him, is not satisfied with good service, does not remember the connexions between remarks, is suspicious, and gives pain to feelings when aggrieved.

875. Here have been narrated the marks as well as functions of princes and others.

CHAPTER III.

GENERAL RULES OF MORALITY.

1. Now are being explained to all the ordinary rules of social polity.

2-3. The activities of all creatures are known to have happiness for their end. There can be no happiness without morality. So one should be devoted to morality [dharma].

4-5. Let not one try to get mokṣa without trying to acquire the other three [*viz*, dharma, artha and kâma], and let him constantly follow [the path of] mokṣa without discarding the other three. This is the [golden] mean in all religions.

6-7. One should have low hair, nails and beards and clean feet and glands, should have daily baths, use scents and decent clothing, but should not be excessively gaudy.

8-9. One should always bear medicinal substances in jewels etc. consecrated by *mantras*, have umbrellas and shoes and walk in the streets with eyes fixed on the straight path only.

10. And at night on occasions connected with death one should be a stick-bearer and have a head-dress.

[1]11. One should not mind other business while under a call of nature nor should use force to stop that call.

12. One should follow with respect friends who do good but keep others at distance.

13-15. One should give up by mind, body and speech the following ten sins: Envy, stealing, illegitimate passions, depravity, harshness, untruthfulness, divulgence of secrets, evil design, atheism and perverseness.

16-17. Man by practising virtues as far as possible does earn merits. There is no doubt about it.

18-19. One should not do in deed the sin that one has thought of in mind. According to religious men one has to enjoy the effects (of sinful work).(?)

20-22. One should serve as far as possible people who are out of employment, who are diseased and who are aggrieved, should always look upon even ants and worms as oneself, and even if the enemy be harmful, should be doing good to him.

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[1] **Śukranîti**, as has been explained above, is not a treatise on political organisation only but is the comprehensive art of life. So one may find economic maxims and precepts in it as well as social and hygienic rules.

In the last few lines we have an account of what the householder's physical and material life is to be. The use of shoes, sticks, head-dress, scents, umbrellas and charmed amulets is recommended.

23. He should have the same attitude towards prosperity and adversity, and envy not their results but their causes.

24. He should speak good, moderate, consistent, and sweet words at the proper time.

25. He should be cheerful, well-behaved, kind and gentle.

26. He should not be happy alone, should not trust every body, and should not be suspicious (or timid).

27-28. He should not declare anybody to be his enemy nor himself to be anybody's enemy, and should not publish the insults or cruelties of the master.

[1]29-30. He should be wise in humouring others by attending to their likes and dislikes and ministering to them in the manner satisfactory to them.

31-32. He should neither repress the senses nor indulge them excessively. The senses run riot easily destroy the mind.

33-34. The antelope, the elephant, the fly, the bee and the fish—these five are ruined through sound, touch, form, smell and taste.

35. Of these the touch of females captivates the heart of even the *muni*.

36. So one should duly enjoy these things with restraint.

[2]37. One should not sit very near mother, sister and daughter.

38. One should call a female according to the relationship, and address her whether related or unrelated as good sister.

39-43. Living with other persons, speaking with them even publicly, independence even for a moment, and residence in their houses should not be granted to females by the husband, father, king, son, father-in-law and relatives ; nor leisure for any thing besides domestic duties.

44-47. The woman gets disgusted with the husband who is cruel, barbarous, severe, always abroad, very poor and sickly, and attached to other women, and takes to some other man. Hence men should carefully avoid these defects to keep their wives.

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[1] आशय—Tendencies.

[2] मलायन —Glands which secrete refuse matter from the body, *e.g.*, eyeglands, armpits, &c.

[3] —Excessive.

48-49. One should keep his wife and children by giving them as far as possible *clothing, food, love and affectionate words, as well as living* always very near them.

50-51. One should not visit places sacred because of *chaityas*, holy flags, shades, ashes, or regions covered with dusts, stones, or places for sacrifices and baths.

52-53. One should not cross the river by arms, nor approach a fallen fire, nor should climb a boat or a tree that is likely to give way, nor (also get into) a bad vehicle.

[1]54-55. One should not turn up the nose nor scratch the ground, should not press the head by folded hands, attempt useless things by the limbs or remain intoxicated for long.

56. One should desist from activities of body, mind and speech before fatigue.

57-59. One should not keep the thighs up for long, and at night should not go under trees, or to court-yards, *chaitayas*, squares (crossings of streets) and liquor houses.

60. One should not go to solitary forests, unoccupied houses and cremation-grounds even by day.

61. One should not always look to the sun and should not carry weight by the head.

62. One should not constantly see minute things or burning, (bright) impure and unpleasant substances.

63-64. One should not take food, or dream, study and think about women, sell liquor, practise aiming and receive or give any thing in the evening.

65-66. Ordinary people are the guides and instructors of the wise men for all ordinary activities. Hence the men versed in *Śâstras* should follow these people for social functions.

67-68. One should not abuse the king, the country, the race, the family and the religion, and should not even mentally break the custom of the folk though that were possible.

69. One should remedy what has been said or done improperly—not however by force but by reason.

70-71. Men are very rare who can openly declare their vices. Hence the wise man should forsake the undesireables by finding them out from public opinion as well as the rules of *Sâstras*.

[1] **विगुण—Useless.**

अनृजुन—Intoxicated.

72. One should not ever in mind reflect on the immorality that looks very like morality.

73-74. 'I am guilty of thousand offences, what if I commit one more?' One should not practise vice by thinking in this way, for a vessel is filled by drops.

75-76. 'How should my days and nights pass in the future?' One should not thus be a pessimist but should always remember (past things).

[1]77-78. One should first get rid of arrays of compound argumentative discourses, and rules got-up or made according to one's desires, reject the hymns, praises and adulations and then carefully collect the spirit or essence (of Śâstras).

[2]79-80. The theory of religion and moral is very complicated hence people should practise the rules of *Śruti*, *Smṛiti* and *Purâṇas* which have been followed by the good men.

81-82. The king should neither protect nor allow residence to the friend, son, preceptor, thief and enemy who are addicted to vicious practices.

83-84. One should know the following six classes of enemies—those who set fire, poisoners, armed ruffians, robbers of wealth, plunderers of fields and seducers of wives.

85-86. The wise man should never for a moment disregard the wife, the child, the disease, the slave, the cattle, wealth, studies and attendance to the good.

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[1] Here is Śukrâchâryya's advice as to the interpretation and acceptance of Śâstras. He refers to the difficulties arising out of the peculiar characteristics of the Sanskrit language and of the Hindu written documents as well as out of the tendencies of people to interpolate, add, or take away texts according to the needs of the time. It, therefore, requires great skill on the part of guardians of society to remove the extraneous matter and find out the real spirit of some injunction.

समासव्यूह—The peculiar arrangement of compounds. This grammatical difficulty is of no mean order. For तत्पुरुष and बहुव्रीहि compounds of the same words give thoroughly different interpretation. These, therefore, have to be first considered.

कृत Got up—Interpretations or texts may be concocted or interpolated.

हेत्वादि—Long chains of argumentative reasoning and interpretation, when found in text-books, are real hindrances not helps to those who seek truth and want guidance.

स्तुत्यर्थवाद—Exaggerations and overstatements of which Hindu treatises are full should be carefully weighed before the injunctions of the *Śâstras* can be accepted for practical life.

[2] The moral and religious guide is not the book but the man.

87-88. One should not live for a day at a place where the king, the rich people, the priest, the physician, the custom and the country are antagonistic to him.

89-90. One should not live for a day at a place where the officers are impotent, and females and children barbarous, foolish and adventurous.

91-94. One should not wish for wealth, fame, life and residence at a place where the king is indiscreet, councillors are partial, the learned men are deserters of good paths, witnesses are liars and where there is predominance of the female and the lower folks.

95-96. What is the good of crying at a place where the mother does not nourish in infancy, the father does not educate well and the king is the robber of wealth ?

97-98. What is the good of crying at a place where the friends, relatives and the kings are angry even though they are well served, and the house is liable to be destroyed by fire or thunder ?

99-100. What is the good of crying at a place where through neglecting the advice of authorities and conducting oneself through pride evil consequences ensue ?

101-102. One should always carefully respect the king, the god, the preceptor, the fire, the ascetic and the man who is old in age and virtue.

103-104. One should never even mentally go against or do harm to the mother, the father, the preceptor, the husband, the brother, the son .and the friend.

105-106. One should not fight with relatives or challenge the powerful or quarrel with the women, children and the elderly and the foolish people.

107-108. One should not eat good things alone, study problems and interests alone, travel in the streets alone, or keep up alone among sleeping men.

109-110. One should neither follow nor obstruct the duties of another man ; and should never sit on the same seat with people who are of inferior grades in character and work and with females.

111-113. The following six vices have to be got rid of by men who want prosperity in this world—sleep, sluggishness, fear, anger, laziness, and procrastination. There is no doubt that these are great hindrances to work.

114-115. The man who is resourceful, practises Yoga, is learned in theories and is brilliant in intellect, is always mindful of his own duty and abstains from the pursuit of others' wives.

116-117. One should be a good speaker, know the significance of words and their position, be a word-painter and always cheerful in expressions, should always hear for long and understand very quickly.

118. One should enjoy one's goods after knowing them.

119. One should not disclose his excessive zeal for sale or purchase and his own misery.

120-121. One should not enter another man's house without business and without permission and unasked should not say to anybody things happening in one's house.

122-123. One should make his talk with few words but of much significance for the accomplishment of his object, and should not give out his own opinions without [fully] understanding [the subject-matter].

124. After having fully known other's opinions

125. One should not make father or son witnesses to the quarrel between husband and wife.

126-127. One should mature policies in careful secrecy and should not forsake the man who takes shelter with him, should wish to work to the best of his ability, and should not get dispirited under danger while working.

128-129. One should not touch any man to the quick and should not say false things about anybody. One should not abuse anybody nor make anybody indulge in madness.

[1]130. An action which is religious but disapproved by the people does not lead to heaven.

131. Whose words do not frustrate themselves by their own logic?

132. One should make reply after careful consideration and not speak abruptly.

133. The merits of even enemies have to be recognised while the demerits of even preceptors have to be got rid of.

134-135. Neither prosperity nor adversity is likely to be permanent. It is only the work of past lives that is the cause of permanent wealth or misery.

136. Hence one should not diminish love in all creatures.

137-138. The king should ever be far-sighted and have presence of mind; should never be adventurous, slothful or procrastinating.

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[1] **अस्वर्ग्यं—The possibility of a conflict between formal morality (and religious codes) and people's conscience is here suggested. The advice of Śukrâchâryya is to follow the *Vox populi*.**

139-140. The man who proceeds with a work after knowing it to be highly difficult, and who has long views at the commencement enjoys happiness for ever.

141. The man who has presence of mind can proceed with the work as he gets it.

142. Success is doubtful either through fickleness or through difficulty of the work.

143-144. The man who does not attempt the work even at the proper time is lazy. He can never have success and is ruined with his family.

145-146. The adventurous man is he who commences a work without knowing the effects—is sure to be unhappy either through the action or its effects.

147-148. The procrastinating man is he who does little work in much time. He suffers from insignificance of results. One should therefore be far-sighted.

149-151. Work done adventurously may sometimes bear good fruits. Sometimes even well-considered actions are futile. Yet one should never do anything abruptly, such actions are harmful.

152-153. Sometimes good comes out of evil actions. And the evil which comes out of a good action is not the source of evils.

154-155. That work is not to be suspected which is avoided by the servant, the brother, the son, and the wife but done by the friends.

156-157. The foolish man who without knowing fully [the capacity of] a friend, employs him in some act of friendship, gets his object frustrated.

158-159. The mental attribute of any man cannot be easily discovered. So one should try to acquire friends. Acquisition of friends is happiness to men.

160-161. One should not confide too much in any trustworthy person, *e.g.*, the son, the brother, the wife, the ministers or the officers.

162. Since the desire for wealth, women and kingdom is great in all men

163-164. One should trust only those actions which have been tried and proved. Having placed confidence in some body as oneself one should weigh his action personally.

165. He should not consider his words useless or antagonistic simply by reasoning.

166-167. One should forgive the trustworthy person if his action leads to loss of one sixty-fourth part of its fruit. The man who is religious, moral and powerful should keep up friendship with him.

168-169. One should honour the respectable persons with gifts, distinctions, &c., and should never be severe in punishment or harsh in words.

170-171. Even the wife and the son get terrified by punishment and harsh words. Even beasts get tamed through gifts and sweet words.

172-173. One should never be mad or vain with learning, valour, wealth, birth or strength.

174-175. The man who is proud of his learning does not care for the advice of the authorities and considers even harmful things as desirable as useful things.

176-178. The man who, proud of his valour, abandons the path followed by the people loses his life by rashly undertaking warfare, and though armed, by giving up the recognised military tactics.

179-180. The man who is proud of his wealth does not know of his own infamy just as the goat uses his urine to wash his own urine-scented mouth.

181-182. So also the man who is proud of his birth disregards all persons, good as well as other men, and directs his attention to bad actions.

183-184. The man who is proud of his strength applies his mind ably to warfare ; obstructs everybody by his strength or even the animals.

185-186. The man who is proud of his distinction looks upon the whole world as a piece of straw. The worthless man also desires the most precious of all seats.

187. These are known as *mada* or passions of the vain and the following are the *dama* or virtues of the good.

188-189. The result of learning is wisdom and humility, that of wealth is sacrifice and charity, that of strength is known to be the protection of the good.

190. The result of valour is that enemies are subdued and made tributaries.

191. The simple result of good birth is contentment and moderation.

192. The result of fame is that all are like oneself.

193-194. One should give up vanity and carefully receive knowledge, *mantra*, medicine, wife and gems even from low families.

195. One should give away that when received, which one does not care for when lost.

196-197. One should neither caress or repress too much the wife or the child, but should appoint them to domestic duties and to studies respectively.

198-199. One should not take anything however small belonging to others which is not given, should not publish the vice of any man and should not abuse the wife.

200-201. One should not give false evidence and stop the evidence that has been produced, but should speak untruth when life or great affairs are at stake.

202-203. One should not point out, even where known, the poor man to the man who wants to give away his daughter in marriage, the moneyed man to the thief and the man who has hidden himself to the murderer.

204-205. One should not create dissensions between the husband and wife, mother and father, brother and brother, master and servant, sister and sister, friend and friend, or between preceptor and disciple.

206. When two persons are talking, though even seated, do not go between them.

207. One should attend to friend, brother and relative as to one's own self.

208-209. One should honour by questions of health, gifts of water, etc., the man who though humble, has come to his house.

210-211. One with sons should not ask his daughter who has children to live in his house or the sister with her husband ; but should maintain them when they are widowed.

212-213. The snake, the fire, the wicked man, the king, the son-in-law, the nephew, the disease and the enemy—these are not to be disregarded as being too small.

214-215. One should deal with these from the standpoint of cruelty, sharpness, wickedness, sovereignty, daughter's prestige, one sharing in the privilege of offering manes to the ancestors, increase and fear.

216. One should not preserve anything of debt, illness and enemy as remainder.

217-218. Asked for something by suppliants one should not make harsh reply, but do what they want or ask somebody to do that.

219-220. One should eagerly listen to the praises of the charitable, the religious minded and the valorous, but should never care for their blemishes.

221-222. A man should take good and moderate food and walk at the proper time, eat after giving to the gods, live in pleasure, always have sweet thoughts and be pure.

223 He should always enjoy, eat and commit nuisance in private places.

224. He should be always active and take part in physical exercises with pleasure.

225. One should not abuse food, and if quite well should accept friendly feasts.

226. The best menu of food is that which contains all the six tastes beginning with sweet.

227. This is about enjoyment (carnal).

228. The best exercise is fight and wrestling with the expert athletes.

229. Sleep is best during night excluding the first and last Yâma.

230. The miserable, the blind, the dwarf and the dumb are never to be laughed at.

231. One should not apply one's mind to wrong deeds but carry out one's own duties without delay.

232-233. The man should give up vanity (and do his duty) by perseverance, strength, intelligence, patience, rashness or prowess.

[1]234. If the task is accomplished by quarrel, quarrel is good.

235. Otherwise life, wealth, friend, fame—all these are destroyers of happiness.

236. One should not say undesirable things to, and should not look to the defects of, anybody.

237. Commands of the great and of the king are not to be violated.

238. One should advise even the preceptor who appoints one to an evil action.

239. But one should not disregard an inferior person even when he prompts him to good action.

240-241. One should not leave his place by making the young wife dependent on herself. Women are the roots of evils. Can young females be left with others?

242. One should not get intoxicated with spirituous liquors and should not indulge in evil company.

243-248. The chaste wife, step-mother, mother, daughter, father, wife, widowed daughter, or sister who has no offspring, aunt, brother's wife, sister of father or mother, grandfather, preceptor who has no son,

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[1] The work is to be done by hook or by crook.

father-in-law, uncles, grandson who is young and orphan, brother, sister's son,—these must be maintained carefully to the best of one's ability even under adverse circumstances.

249-250. In times of prosperity one should maintain the families of both parents, friends, wife's family, and the attendants, servants, and maid-servants.

251. One should maintain also the deformed, the stranger, the poor and the helpless.

[1]252-253. Woe to the man who does not take care to maintain his kith and kin. All his virtues go for nothing. In fact, though living he is dead.

[2]254-255. What is the value of his life who does not maintain relatives, who does not subdue enemies and who does not protect things acquired ?

256-257. The man who is mastered by his wife, the debtor, the valetudinary, the beggar, the worthless, and the man who is dependent on enemies—all these are dead though possessing life.

258-259. One should hide the number of years lived, wealth, domestic follies, *mantra*, carnal enjoyments, medicines, charity, honour and insult.

260-261. One should without loth undertake travels, attend royal courts, study Śâstras, see prostitutes and make friends with the learned.

262-263. Through travel the numerous religions (customs), materials, animals, races of men, hills, etc., come within the cognisance of man.

[3]264-267. The man who habitually attends courts and assemblies, acquires knowledge as to the character of kings and royal officers, the nature of justice and injustice, the men who falsely quarrel and the men who have real grounds of conflict, and the procedure of cases and suits both customary and legal.

268. One who studies the truths of *Śâstras* cannot be vain and bigoted.

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[1] No more powerful account of the joint-family system can be devised than that given in these lines.

[2] The *sanction* for co-operative domestic life as opposed to competitive individualism is also very strong.

[3] Education in politics through taking part in administrative institutions even as audience is highly recommended in modern times.

[1]269. But one who studies only one *Śâstra* cannot decide upon any course of action.

[2]270-271. The intelligent man, therefore, should inspect many sciences and always study carefully many *Śâstras.*

272-274. The prostitute takes others' money but does not become their slave, on the other hand is competent enough to overpower them, so one should come under nobody's authority but have the world under oneself.

275-276. Through associates with learned men meanings of *Śruti, Smṛiti, Purâṇas* are known and intelligence gets quickened.

277-278. One should never eat food without giving it to the gods, ancestors and guests. The man who cooks for himself only through foolishness lives only to go to hell.

279-280. One should give the road to superiors, the strong, the diseased, the corpse, the king, the respectable people, the man who is observing a vow and also to the man who goes in a conveyance.

281-282. One should keep five cubits from the carriage, ten cubits from the horse, one hundred cubits from the snake, and ten cubits from the ox.

283-284. One should not trust the abodes of the horned, nailed and toothed animals, the wicked people, rivers and women.

285-286. One should not, while eating, go along a street or speak with laughter, should not sue for what is lost or talk of one's own deeds.

287-288. One should leave the company of those who fear himself, give up the service of the lower orders and should never hear stealthily the conversation of others.

289-290. One should not desire work with the superiors unless requested by them. The head of Râhu was cut down through drinking with the gods.

291-292. Evil actions of the great become their ornaments as it were. The drinking of poison by *Śiva* would cause death to others.

293. The powerful man can destroy everything just like pure fire.

294. One should not stand in the presence of the preceptor, the king and the superiors.

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[1] Practical life is so organised that one aspect is dependent on another So for the guidance of man all the sciences have to be requisitioned. Otherwise the injunctions will be too narrow, one-sided and conflicting.

[2] An art is based on many sciences. The art of human life is thus built up on many Social Sciences. Hence the necessity of having a multiplicity of subjects in a course of studies whether for pupils or for guardians of states,

295. One should not desire anything even mentally on the strength that 'the king is my friend.'

296-297. One should not desire sovereignty over or subjection to fools, chivalry with the great, flattering the people who are proud of their little learning.

298-299. The wise man takes to his duties in the order of their importance as absolutely necessary, unnecessary, etc., or in the order of their arrival as received first, last, soon or late, etc.

300-301. The procrastination of Gautama's son in the evil action of killing his mother, though commanded by his father, has been well honoured.

302-306. One should always master the world by love, association, praise, submission, service, artifice, arts, words, wisdom, affection, simplicity, valour, charity, learning, getting up or coming in front to receive superiors, words spoken with cheerful smiles, and benefits rendered.

307-309. These methods of subjugation are quite useless with regard to wicked people. The wise man therefore should leave their company, and if possible should overpower them by force of punishment, stratagems or such like methods.

310-311. The study of *Sruti*, *Smriti*, *Purâṇas* together with the *Aṅgas*, *Upavedas* and *Kalâs* is always beneficial to man.

312. Hunting, gambling, girling and drinking—these are the passions of man.

313. One should give up these four and be rational.

314-315. One should not use craft in dealing with anybody or destroying his income, and should not even mentally desire harm to anybody.

316-317 That action is good which makes the three epochs become firm, *e.g.*, which leads to attainment of heaven after death, and fair and permanent reputation while alive.

322. One should not imitate either the king or the superiors.

323. One should not go alone to attack snakes, tigers and thieves.

324. One should slay the assassin, even though he is a preceptor, who tries to kill him.

325. One should not aid in a conflict but should protect the leader.

326-327. One should not sit on important seats before preceptors and the king; nor being arrogant, distort their sayings, through (false) reasoning.

328-329. The inferior man does not know what ought to be done, but knows what has been done (and so blindly follows the precedence). The superior does not divulge what he is going to do or what he has done.

330-331. One should not totally accept without verification wife's statements about the offences of mother, son's wife, brother's wife and co-wife.

332-333. The eight natural defects of women are mendacity, rashness, attachment, foolishness, greed, impurity, cruelty and vanity.

334-335. One should not chastise by harsh words the son after the sixteenth year, the girl after the twelfth year, nor should punish the daughter-in-law.

336-337. Daughter's sons, sister's sons and brothers are more important than sons. Brother's wives, sons' wives and sisters are to be maintained as being more weighty than daughters.

338-339. For the maintenance of relatives the master always tries to earn and keep (wealth). Others (who do not do so) are as it were thieves.

340-341. About association with females.

342-345. One should give away his daughter in marriage to, and be friends with, somebody after examining his wealth, birth, character, form, learning, strength and age ; he may give his daughter even to a penniless man who possesses (proper) qualifications of age, learning and beauty, and should not judge (bridegroom) by his beauty, age and wealth and who asks for a wife.

346-347. One should first examine the family, then learning, then age, then character, then wealth, then form and lastly the country of birth ; marriage is to be entered into afterwards.

348-349. The daughter wants beauty, mother wealth, father learning, friends high birth, outsiders food and festivities.

350-351. One should have for his wife the girl who is born in the race of a *Ṛiṣhi* who is not the same as his, who has a brother, whose family is good and who has no defects of birth.

352-353. One should pursue learning by moments and wealth by grains. The moments and the grains are not to be left out by the man who wants learning and wealth.

354-355. Daily acquisition of wealth is good for wife, children, and friends, and also for charity. But without these what is the good of having men and money ?

356-359. One should carefully preserve wealth that can maintain life in future. 'I shall live for one hundred years and enjoy life with wealth'—one should ever earn learning and wealth in this hope for twenty-five years or half or a quarter of that period.

360-361. The wealth of learning is superior. It grows with gifts, is not burdensome and cannot be carried.

362-363. So long as there is wealth one is respected by all. But the man without wealth though well qualified is deserted by wife and sons even.

364-367. In this world wealth is the means to all pursuits. So man should try to acquire that by good ways and means, *e.g.*, by good learning, good service, valour, agriculture, usury, store-keeping, arts or begging.

368. One should practise whatever means makes a man wealthy.

[1]369. Meritorious men stand at the door of the wealthy people even as menials.

370-371. Even defects are regarded as merits, and even merits become defects of the wealthy and the poor respectively, and the poor are insulted by all.

372-374. Through abject poverty some people got death, some went to the village, some to the hills, and some to utter ruin, some got mad, some came under subjection of enemies.

375. And owing to insufficiency of wealth some people become slaves of others.

376-377. One should keep the money together with the written account in such a manner that one's own wife, children and friends cannot know how much has been stored by and where.

378-379. For business men, there is no other memorandum besides written record. So the wise man should never transact business without documents.

380-381. Well earned wealth may be deposited with the non-covetous, the rich, the king, the trustworthy and the charitable by receiving written statements.

382-383. One should pay money to a friend without interest. Much wealth placed with the friend is not harmful.

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[1] The means of livelihood mentioned above are eight in number.—

(1) Learned professions—Art of teaching, etc. (2) Service. (3) Heroism (Soldier's art). (4) Agriculture. (5) Usury. (6) Commerce, shop-keeping. (7) Industries and arts. (8) Begging.

384-385. Having seen that the debtor is capable of transacting business even (on loans) with interest, one should lend him money in the presence of those who stand bail, and of witnesses having received pawns and written statements about the transaction.

[1]386. One should not lend out solely for the sake of interest lest capital should be lost.

388. One should give up shyness in the matter of eating and enjoyment.

389. Wealth makes friends when given but enemies when not given.

390-391. One should be liberal at heart but miserly in outward relations, and should spend properly at the right time.

392. One should maintain by all his wealth, his good wife, children, and friends as far as possible.

393. One's own self cannot, but all else can, come again. So (one should maintain by all his wealth) oneself also.

394 If one is alive one can see many good things.

395-397. The father desirous of the welfare of the family should divide his wealth when his sons are married and grown up. But grown up and married brothers also should divide among themselves. For otherwise even brothers by the same mother get into ruin and destruction.

398-399. A man should not live together with two wives in the same house, but should allot them separate apartments; for animals only so herd together, but not human beings.

400-401. The sons should not divide the wealth that is the cause of increase (in interest, *i.e.*, working as loan-capital) being placed with debtors, nor the wealth that is to be paid back to the creditors.

402. You should not desire wealth of the man whose good friendship you want to have.

[2]403-404. (You should not also) engage secret spies about him, speak with his wife, look down upon him, or contradict him.

405. You should not also be indifferent to his activities or disregard the evils that befall him.

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[1] **Points to be noted with regard to a loan transaction :—**

(1) The business qualifications of debtors to be studied व्यवहारस्तम.

(2) There must be pawns or securities बध.

(3) There must be men who stand bail (प्रतिभू).

(4) There are to be witnesses.

(5) Receipts for value received as well as documents mentioning other conditions should be prepared गृहीतलिखितं.

[2] **प्रतीत—Cross, contradictory.**

406-407. One should give away the money as if it were being received without any pain whether the loan be with or without interest.

408. But not without witnesses and signatures on the *Ṛiṇapatra* (handnote).

409-410. The best men are those who are noted for the qualities of themselves, of their fathers or their mothers. People are celebrated separately for their own qualifications, as well as for the virtues of fathers and mothers.

411. People may be good, middling, low and very low (who are famous) through the merits of their brothers.

412. The worst men are those who have to depend on the virtues of the daughter, wife, and sister.

413-414. After having amassed wealth one should maintain his family. The wise man should never pass a day without giving away something.

415-416. 'I am at death's door, my life would not linger a moment. Besides these two there are no other friends of mine in future life.' Thus considering, one should practise charity and virtue.

417-418. None else will be my friends in the next world but these two (charity and virtue); the world exists through charity and good conduct, and not through wickedness.

419. Friends come through charity.

420-421. The *sambiddatta* gift is that which is meant for future life, *e g.*, that given for gods, sacrifices, Brâhmaṇs and cows.

422. The *paritoṣya* or gift of pleasure is that which is given to the songsters, athletes, and dancers, &c.

423. That which is given for fame is known as *śriyâdatta.*

424-425. The *hridatta* or gift of courtesy is that which is given on marriage ceremonies, etc., by way of presents to friends, relatives and kinsfolk.

426-427. The *bhidatta* or gift of fear is that which is given to the king, the powerful or the obstructor of interests for the furtherance of one's own cause or out of fear from sins and vices.

428-429. The *pâpadatta* or gift of sin is that which is given to promote enmity or which is lost through gambling or which is meant for association with others' wives.

430-431. He should always glorify the lord whom he serves, he should never disparage him; he should be always alert in his service and try always to please him.

432-433. In this world there is nothing more capable of subduing others than charity and simplicity. The moon that has waned through gifts, when waxing, is beautiful though in the form of a curve.

434-435. One should act after considering love, enmity, etc., but should not undo anything after it is done.

436-437. One should not have these things in excess—harshness, deceitfulness, mildness, exaggeration, attachment to work, and zeal.

438. Excess is ruinous. So one should avoid it.

439-440. People get exasperated through harshness, cast abuse on miserliness, do not reckon anybody for his mildness, and insult a man for his over-statements.

441-442. Poverty comes through excessive charity, insult through excessive cupidity, and foolishness is begotten of excessive zeal.

443. Want of observance of rules leads to moral degeneration, repression is folly.

444-445. The wise man should never consider "I am superior to all, I am more learned than others. Such and such is certainly the religious injunction."

446-447. One should remember that there is the animal which devours the devourer of whales, *Râghava* (animal) is the devourer of that even, and there is the destroyer of *Râghava*.

448-449. One should not desire equality with gods, cows and Brâhmaṇas. This is very harmful and destructive to the whole family.

450-451. One should always worship, respect and serve these. It is not known how much of the spirit divine is implanted in each.

[1]452. One should not make young wife, wealth and books dependent on others.

453. If made dependent, these things are got back by accident but damaged, spoilt and injured.

454-455. The wise man should never spend much wealth for small things, nor accomplish insignificant ends by spending much wealth through pride.

456. And should not abandon good actions for fear of great expenditure.

457. One should not bear malice to or be angry with messengers because of their bad manners.

458-459. The intelligent man should not even out of fear say anything by which friends are abashed, separated or get apathetic.

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[1] The mention of पुस्तक or books in this connexion is highly interesting as indicating the custom of lending out books from one's library.

460-461. The wise man should never talk to persons with whom words, good or bad, are equally fruitless, as musicians do not sing to the deaf.

462-463. The man who does not interfere with a friend who is bent upon vices by entreating him to the best of his ability is known by the learned to be a *nṛiśaṃsa* or cruel being.

464-465. That man is not known to be a friend who does not take care to mediate in the conflicts between relatives.

466-468. Through harsh words even friends who have been maintained since birth and who have been served with gifts and honours become enemies instantly as it is impossible to extricate from the mind the sting of crooked words.

469-470. One should carry the enemy on one's shoulders so long as he is more powerful than oneself; but after knowing that his strength has been impaired, should break him down as a vessel against a stone.

471-472. The ornament, the kingdom, strength, learning or wealth does not adorn a man so much as courtesy and gentleness.

473-479. Speed in horses, splendour in jewels, mercy in kings, gestures in prostitutes, sweet voice in singers, charity in rich men, prowess in soldiers, plentiness of milk in cows, restraint in ascetics, eloquence in learned men, impartiality in councillors, truthfulness in witnesses, devotion in servants, good counsels in ministers, silence in fools, faithfulness in wives, are the proper ornaments.

480. The opposites of these are improper attributes of the subjects (mentioned above).

[1]481-482. That house shines (prospers) which has one and not many heads, and which has many members, lamps, cows and young ones.

483. One should not be indifferent to the cruel animals but kill them at once.

484-486. Meanness, roughness, thieving, malice, covetousness, untruthfulness, obstruction of work, as well as idleness are offences even for meritorious persons and grow by eclipsing their virtues.

487-488. The destruction of wealth is very sinful if the mother be young, wife be middle-aged, and the son be old.

489-490. Childlessness of wealthy people, foolishness of poor people, bad husbands of women, and loss of interest are not for happiness.

491-492. The following six again are not for happiness—foolish son, bad daughter and wife, poverty, service of the lower orders, as well as perpetual debt.

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[1] The components of an ideal household are mentioned here. Cows are indispensable.

493-496. The man who does not find pleasure in teaching, learning, gods, preceptors, Brâhmaṇs, arts, music, service, simplicity, wife, valour, penances, and literature is either a man who has attained salvation, or a cheat or a beast in the form of a man.

497-498. The cheat is he who cannot tolerate another's prosperity, who picks holes in other's pockets, who is a calumniator, and quarrelsome, and whose mind is mean but face is bright.

499-501. That little knowledge resulting from the study of the treasure of the Vedas which is not enough even for one person becomes overflowing when it is rightly directed and increased through hope [of doing good to others]. But that very learning becomes mischievous when employed for selfish ends and merely to find fault with others.

502-503. The cheats become honest when giving advice to others. But they commit a hundred misdeeds for their own sake.

504-506. That son gives happiness who obeys father's command, and is active in his service, always follows him as a shade and tries to earn, and who is versed in all the branches of learning.

507. The son who has the contrary qualities gives pain and is the destroyer of wealth.

508-511. That mother gives satisfaction who is always devoted to her husband, skilled in domestic duties, bears children, well disciplined, husband's darling, young in age, pardons the offences of children and nurses them. Any other woman is *kulaṭâ* and is the cause of pain.

512-513. That father is good who cares always for the child's learning and income, and ever disciplines the lad well.

514-515. That man becomes one's friend who is always of help to him, never speaks anything against him, and tells the true and good things.

516-517. Intimacy with inferior men, frequent visits to other's houses, antagonism with the race and the community, and poverty—all these lead to loss of reputation.

518-519. Association with tiger, fire, snake and other ferocious animals is not good. Even when served, the king and these things can never be friends to anybody.

520-523. Antipathy of friends, predominance of enemies, poverty of the learned men, the possession of many children to poor people, permanent residence in places devoid of rich and qualified persons as well as physician, king and water, only one daughter to a father, and begging—all these are for misery.

524-526. About the relation between husband and wife.

527. *Just as the child becomes docile through feeding and caressing so also the wife.*

528-529. The wise man proceeds with the work after carefully weighing its nature, instruments, expenditure, and does not commence even insignificant work otherwise.

530. The wise man should not like to do a thing that exceeds the expenditure (fixed).

531. The man of business should undertake that work which yields great profit.

532. The value and measurement of commodities are always desired in exactness.

533-534. A proxy is not desirable in the matter of penances, women, agriculture, service, enjoyment and eating, but should be appointed for other functions.

535-537. The wicked and the thief always want solitude and good food, those who have powerful enemies want help, the prostitute desires friendship with the rich, the bad king desires craft, and the bad servant desires the master's goods, the learned man wants knowledge (truth), the priest wants pride, fire and sacrifice.

538-540. The beautiful woman wants a beautiful man, the prostitute wants a paramour, the diseased a physician, the store-keeper high prices, the beggar the charitable.

541. The terrified seeks a protector, the wicked man an opportunity.

542-543. The foolish man behaves roughly, is quarrelsome, sleeps always, takes intoxicants, does useless things and ruins his own interests.

544-545. The *Kṣatriya* is one in whom the *tâmas* quality preponderates, the Brâhmaṇa is one in whom the *sattwa* preponderates. The other (Vaiśya) is one in whom the *rajas* preponderates. Among all these the best is that in whom the *sattwa* preponderates.

546-547. The Brâhmaṇa dominates all through his own deeds. Among the *Kṣatriyas* and others the particles of his attributes exist.

548-549. Seeing the Brâhmaṇa who practises his own duty others including Kṣatriyas get terrified. So one should practise his own duty.

550. That activity is good which does not lead to failure in one's own duty.

551. That country is good where the kith and kin are supported

552-554. Agriculture which is said to have rivers for mothers, is a good occupation. The occupation of *Vaiśyas* is intermediate, that of Śûdras is inferior. Begging is lower than that but excellent in ascetics.

555. At times service is a good occupation as that to a king who is virtuous.

556-557. The income that is derived from salary for priestly functions leads to great wealth. Commerce is useless.

558. Wealth cannot accumulate without service to the State.

[1]559-60. But service to kings is very intricate, cannot be well performed by anybody except the intelligent. It is like the *asidhârâ* ceremony.

561-562. The minister masters the king by the force of *mantra* (charm or counsels), just as the snake-charmer subdues the snake. But intelligent men fear the king very much.

563. The spirit of Brâhmaṇa exists in learned men, that of Kṣatriyas in the king.

564-565. The wise man is always near though he lives at a distance. He binds the men by the ropes of intelligence and attracts and represses them.

566. He is resourceful even in matters beyond one's perception and hence though living near may be influencing distant (activities).

567. Intelligence should not be overpowered by the *anuvâkas* but should be useful in practice.

[2]568. The intelligence that is overpowered by these cannot move.

569-570. It is better to be poor first and rich afterwards just as it is better to be a pedestrian first and go in a vehicle aftewards.

571. The above order leads to happiness. The opposite order to sorrow.

572- 573. It is always better to have no son than to have sons that are dead. Pedestrianism is better then using bad vehicles. Indifferentism is better than conflicts.

574-575. It is better to cover feet with shoes than try to cover the whole earth with leather. Ignorance is better than vanity due to little learning.

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[1] असिधारा—A religious ceremony in which a sword is placed between husband and wife. It is thus very difficult and dangerous. So also Government service.

The above lines contain Śukrâchâryya's gradation of occupations and means of livelihood according to income, dignity, etc.

[2] अनुवाक—Section of the Vedas. Students of the Vedas become practical fools incompetent to deal with व्यवहार्यं, *i. e.*, ordinary transactions of life. Their intelligence is also immobile or inelastic सर्वत्रगामिनी., *i. e.*, they cannot be made to apply their intelligence to the accomplishment of various purposes, *e.g.*, those beyond the study-room, &c,

576-577. Life in a forest is better than that in other's houses. Begging and death are better than being a householder with a bad wife.

578-579. Debt, pregnancy, sovereignty, friendship with the wicked, bad diet—these are pleasant at the beginning but lead to misery in the end.

580-581. The king always suffers through bad advisers, the patient through bad physicians, the subjects through bad kings, the family through bad children, and the soul through bad motives.

582-583. The elephant, the horse, the ox, the child, the wife, and the parrot get the qualities of their teachers through association.

584-585. Success comes from timely speeches; celebrity from good dress, and honour in assemblies from learning. These three come through possession of ability.

586-588. Good wife, good son, good learning, much wealth, friend, faithful servants and maid-servants, good physique, decent dress, and good king—these ten lead always to human happiness.

589-590. Old, well-trained, and trustworthy women who observe the rites and ceremonies, or men of impotent sex should be appointed within the inner appartments—no young man even if he be a friend.

591. One should do his work by regulating the time not otherwise.

592-593. One should apply the ideas of self to cows, &c., and self to wealth and virtue, appoint the mother to cooking of food and the preceptor to the work of teaching.

594. One should always go into the interior without any regulation.

[1]595-597. In foreign lands the following six are useful to men—wife without child, good conveyance, the bearer, the guard, the knowledge that can be of use in relieving other's miseries, and an active servant.

598-599. One should not obstruct a road though he is capable And even the king should not go into a market place in a conveyance though that is good enough.

600-602. One should always travel with companions not otherwise; and take rest, while travelling, in places which have good roads and tanks hard by—but should not stop on roads or in forests.

603-604. Excessive walking, fasts, over-indulgence and over-exercise soon bring about men's old age.

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[1] The practice of undertaking distant tours is suggested here,

[1]605. Excessive pursuit of all branches of learning even the fine arts also leads to old age.

606-607. The man who talks of one's demerits as if they were merits becomes dear to him. Is not the man who cries up one's merits his friend?

608-609. The dear friend who speaks of demerits exactly becomes unfriendly. Can that man be friendly who talks of one's merits as if they were demerits?

610-611. Even gods are overpowered by praise, what about men? Hence nobody dare describe one's defects in one's presence?

612. So one should consider one's defects according to *Śâstras* and popular opinion.

613-614. The man who is pleased and not angry with hearing of his own defects, and who exerts to discover his own weak points and abandons them when told by others.

615. Who after hearing of his own merits remains the same and does not display vanity.

616-617. Who considers "I am the mine of all defects—why attribute merits to me? Ignorance also is in me," is superior to all.

618. He is *sâdhu.* The gods do not attain a portion of his sixteenth part.

619-620. To the good man even a very insignificant benefit appears very high, while the wicked man considers a service even less in amount than a mustard to be huge.

621. The good man considers the man who forgives to be powerful, while the wicked man considers otherwise.

622. So one should pardon the evil words of the good man as well as the wicked man.

623-624. One should not play with others in such a way as to lead to quarrel. And even for fun one should not abuse another man by saying 'your wife is a prostitute.'

625. Slang should not be used to anybody even in a friendly way.

626-627. One should not hide anything from a friend nor divulge his secrets. Even after becoming his enemy (one should not divulge) secrets spoken before.

628-629. One should not point out any wickedness even if known, rather one should try to remedy and offer remedies secretly.

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[1] अनभ्यास—The proper reading should be अत्यायास or over-exercise,

630-631. One should say truly of a thing that is powerful but injurious; but should regard as unseen what has been seen, and as unheard what has been *heard.*

632-633. In times of danger one should appear dumb, blind, dwarf and lame. Otherwise one suffers misery and loss in business.

634. One should speak words favourable to the old men but not child-like.

635. Going to others' houses one should not look to their wives.

636. One should not receive possession from the poor and of sovereignty.

637. One should educate one's own child as well as others' children but not the offenders.

638-639. One should forsake those places where people are addicted to vicious habits, immoral, fickle, tyrannical and severe.

640-641. Unless requested one should not express, even when known correctly, the cases of the two parties to a suit. Thus one can be free from enemies.

642. One should not take up somebody else's case and pick up quarrel with others.

[1]643. One should not discuss royal policies in an assembly.

644-645. One should not say anything about astronomical injunctions, morality, punishments, medicines, purgatives and effects of actions without special knowledge.

646. Great misery comes of dependence on others. There is no greater happiness than that from self-rule.

647. The man who is not in a strange land, who is a householder and who is independent always enjoys happiness.

648-649. Owing to the intelligence of new and old masters of sociology new rites and rules are springing up every moment.

650. So it is impossible to describe them by direct observation or by inference.

651. This knowledge can be acquired only by analogy and the commands of authority.

652-653. The *Nîti Śâstra* that is common to the king and the commonwealth (people) has been narrated in brief. This remembered by the king is useful to him.

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[1] The idea of an unlawful assembly is slightly suggested here.

CHAPTER IV.

SECTION I.—CHARACTERISTICS OF FRIENDS.

[1]1-2. Now I shall say briefly the chapter of miscellaneous topics. Now you will have to hear briefly of the characteristics of friends, etc.

3-4. The friend and the enemy are of four kinds,—one who does, makes others do, approves of, and helps in, things that are respectively beneficial and harmful.

5-8. That man is a first class friend whose heart melts always at the grief of others, who tries to do good to others, who serves others without the asking and is the protector, at the proper time, of wife, wealth and secrets. Others are three-fourths, halves and quarters.

9-10. The mark of enemies is that there is a conflict between two persons about exclusive ownership over the same matter and that they are destroyers of each other's interests.

11-13. They two are enemies who separately consider "In the absence of brothers all the paternal wealth will be mine. All this will not come to his possession but mine, and I shall enjoy all this exclusively."

14. The man who envies and the man who is envied, both are enemies and can be defined by the same term.

15-17. All kings are unfriendly, secret enemies and seekers of opportunities to men who are valorous, rising, virtuous and powerful. What wonder here? Are they not all covetous of kingdoms?

18. Kings can have no friends, and can be friends to nobody.

19. They become sometimes artificial friends.

20. Some are always friends or enemies by nature.

21-24. Mother, mother's family, father, father's parents, father's daughter, uncle, uncle's daughter, one's own daughter, wife, wife's family, father's sister, mother's sister, one's own sister, daughter's offsprings, king and preceptor—are friends by nature.

25-26. Learning, valour, skill, prowess, and patience—these five are said to be natural friends; wise men follow these.

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[1] This section deals mainly with two things : (1) International Relations and Policies (2) Punishments. And each is treated not solely from the political and administrative standpoints but also with reference to their social bearings. Here also as before, Śukranîti is a treatise on morals (social, economic and political).

The section is eminently interesting as it introduces the reader to the essentially political affairs and theories of the ancient Hindus.

27-28. The son who abides by the father's commands is son properly called. Even one is good if qualified—what with a hundred sons who are unqualified ?

29-31. The following are wicked and cruel by nature—the father who contracts debts, the mother and wife who are addicted to other persons, one's own brothers and father's brothers, and their wives and children are enemies.

32-34. The son's wife, the mother-in-law, the co-wife, the husband's sisters, the brother's wives, the foolish son, the bad physician, the husband who does not protect, the master who is severe, the rich man who is not benevolent (are also enemies).

35-36. The king is the enemy of the wicked, the faithful wife of the faithless, the good man of the cheat, the wise man of the foolish.

37-38. Instructions to the foolish* people are the causes of their anger not pleasure. Just as the drinking of water by snakes is for the making of poison not of nectar.

39-40. The enemies of gradually diminishing strength are first, the kings who live around or very near, then those who live further away and so on.

[1]41. They naturally become inimical, indifferent and friendly.

42-43. Or kings are said to be situated in the following order : First enemies then the friends, then the neutrals, and enemies on all sides.

44. Servants and ministers who are very proximate to oneself have to be checked.

45. One should encourage or control friends according as they are less or more powerful.

46-47. The enemies are to be separated, restrained and repressed. They are to be destroyed by the policies of alliance, partition, etc.

48-49. One should bring friends and foes to submission by appropriate methods just as snakes, elephants and lions are tamed.

50. By appropriate means the terrestrial beings can soar into the sky and even the thunder can be pierced.

[2]51-52. Peace, Purchase, Partition and Penalty—these policies

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[1] The nearest neighbours are the greatest enemies. Those gradually receding from one's territory are less and less powerful enemies.

[2] साम—Alliance or peace with friends as well as others according to circumstances.

दान—Purchase, charity, gifts, etc., for kith and kin as well as others according to circumstances.

भेद—Separation or partition for subjects as well as others according to circumstances.

दण्ड—Punishment for enemies as well as others according to circumstances.

are to be applied separately to (each of the following classes of relations): the friend, relatives, family, subjects and enemies according to one's own reasons.

53-54. One can be friend with such men as are of the same age, character, learning, caste, vices and occupations.

55. 'No one is such a friend as yourself'— this remark to a friend is called *Sâma.*

56. 'All my goods are yours, even life'—This is *dâna* or gift to a friend.

57. The narration of one's own merits or those of other friends to somebody is *bheda* or partition as applied to a friend.

58. 'If you do such and such things, I shall not be friend to you.' This is punishment as applied to a friend.

59-60. The man who does not do any good and who disregards other's injuries is *udâsîna* or indifferent

[1]61-62. 'We should not mutually injure each other, but should rather help each other (in need).' This relation is said to be alliance with enemies.

63-64. That policy is said to be *dâna* or gifts to enemies according to their strength and status by which one pacifies powerful foes by tributes or annual incomes from definite tracts of lands.

65-66. The separation of enemies is that which is due to making their friends powerless.

67-69. A punishment applied to enemies is said to be the attack upon them, their wealth and grains by robbers, the aggression upon them with powerful force after noticing their weak points, and not ceasing from war when war has commenced.

[2]70. These methods and policies have to be duly varied according to the varieties of ends to be furthered.

71-72. The statesman-like king should adopt all these policies in such a way that the friends, neutrals or the foes can never go beyond himself.

73-74. *Sâma* is to be first adopted. Then the policy of Purchase. The enemies have always to be played off against one another, and the policy of punishment is to be adopted in times of danger to existence.

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[1] So the policy of साम is prescribed towards enemies also. It is something like an offensive and defensive alliance of modern states.

[2] The mere enumeration of these policies and the statement of the objects for which each is to be applied are sufficient to prove the high political sense of the Hindus. The society which could evolve the state-craft that Śukrâchâryya represents is certainly not that of a race bent solely on other-worldly activities.

75-76. Alliance and contributions to be applied to powerful enemies. *Alliance and separation to those who are superior (in strength). Separation and punishment are to be adopted towards those who are equal. Punishment is desirable when the enemy is powerless.*

77. Alliance and gifts are to be adopted towards friends—never the policies of playing off one against another or punishment.

[1]78-79 The separation and punishment of the subjects of enemies lead to one's success, as well as the collection, by the policies of alliance and gifts, of subjects who are oppressed by the enemies.

[2]80. The banishment of the well-qualified as well as the wicked is always desirable.

81-82. One should never rule his own subjects by the policies of separation or punishment but by those of peace and gifts.

83. The State is likely to be ruined through punishment and partition of one's own subjects.

84. Subjects are to be so governed that they can be neither too powerless nor too powerful.

85-86. Punishment is that which leads to the giving up of bad practices, and is restraint by penalties by which animals are kept within check.

87 That policy is to be administered by the king as he is the lord of all.

88-91. The various species of methods of punishment are the policies of censure, insult, starvation, imprisonment, oppression, destruction of goods, expulsion from the city, marking on the body, shaving of half portions of the body, carrying the person over ignoble animals (*e.g.*, asses), mutilation, execution, as well as warfare.

92-93. Through fear of punishment the subjects become virtuous, do not commit aggressions and do not speak untruths;

[3]94-98. even the cruel become mild, the wicked give up wickedness, even beasts become subdued, the thieves get frightened, the garrulous

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[1] Two-fold policy to be adopted as regards the subjects of enemies. They should be parted off if they are supporters of the existing government or won over if they feel its oppression.

[2] Does it indicate anything of *ostracism* which was intended to expel from the State anybody who won notoriety or fame? Extraordinary ability in any form is likely to cause discontent among the subjects and hence lead to revolutions in States.

[3] The Subject of Punishment has been treated in *Śukranîti* in connexion with the theory of International Policies, but it has grown upon the author; and he deals with it as an aspect of internal administration. The whole picture is thus complete in itself and displays Śukrâchâryya's thorough knowledge of the springs of human conduct.

become dumb, the enemies are terrified and become tributaries, and others are demoralised. So the king should always administer punishments for the furtherance of morality and religion.

99-100. Punishment is good even for preceptors who are proud, do not know their duties and go astray.

101-102. All the methods and means bear fruit through the king's policy of punishment. That is the great stay of virtues.

[1]103. According to the dictates of Śruti the execution of bad men is real *ahiṃsâ*, *i.e.*, mercy.

104-105. One is deserted by good people and acquires sins by always not punishing those who ought to be punished, and punishing those who ought not, and by being a severe punisher.

[2]106-107. It has been said in the *Śâstras* by sages that great virtue arises out of small charity because that is an encouragement to charity and the result of punishments is fear.

108-109. Can virtue that is begotten of horse sacrifices come out of mere recital of hymns? So also can the virtue arising from mercy come out of punishments?

110-111. How can good accrue to a king through punishment of his own subjects? That leads to the destruction of his fame, wealth and virtue.

[3]112-115. There was no punishment in the *Satya Yuga* or the Golden Age because the king then possessed virtue in its entirety. There was full punishment in the *Tretâ Yuga* as the subjects had vice to quarter of its amount. In *Dwâpara Yuga* punishment to the extent of three quarters of its amount was necessary as virtue existed only to half its extent. In *Kali Yuga* punishment to half its extent is desirable as the subjects are poor and miserable through the king's wickedness.

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[1] It thus appears that according to the political morality of the age of *Śukranîti* there is no horror of bloodshed. Śukrâchâryya while advocating punishments and warfares cannot naturally shrink at the sight of blood. So he justifies capital punishments by reference to the Vedas.

[2] सत्कार्थं—In order to incite others to meritorious or virtuous deeds. If small charity leads to infinite bliss men may easily be tempted or taught to be charitable.

भयाय—In order to create fear. If the creation of fear is the object of punishment small doses of it are efficacious. Just as if the object be to induce men to be charitable it should be laid down in the Śâstras that small charity is efficacious.

[3] युग—Ages. Various amounts of punishment prescribed for the various ages of human history because of the varieties in virtues and vices of the people in different times.

[1]116-117. The king is the maker of the age as the promulgator of duties and sins. *The faults are to be ascribed neither to the age nor to the subjects but to the king.*

118-119. Men practise that by which the king is satisfied—why should they not follow his teachings through greed or fear?

[2]120-121. Where the king is virtuous people are also virtuous, where the king is a sinner subjects are also vicious.

122-123. Where the clouds do not pour rain in season there the lands are not productive, the commonwealth deteriorates, enemies are increased and wealth is destroyed.

124-125. Even the king who is a drunkard is good but not he who is very angry and addicted to women. For the severe man irritates the subjects and the other destroys the castes.

126. The man who drinks wine is deprived of his intelligence and loses his business.

127-129. Passion and anger are of the nature of liquor and greater intoxicants than wine. The king through excessive greed destroys the wealth and life of subjects, so the king should administer the State by giving up these three.

130-131. The king should punish his own subjects by being mild internally but cruel externally, and should be severe in punishment towards those who are by nature evil-doers.

[3]132-133. The State is naturally ruined by informers who whisper into the king's ears; so the king, even when informed by these, should carefully study affairs.

134-135. The wise king notices his own faults as well as those of the subjects—and employs himself first, and then the servants.

136-137. Offences are of four kinds—that through the body, that through speech, that through the mind, and that through association. Each again is two-fold, committed voluntarily or involuntarily.

138. Each again is two-fold—known and approved.

139. Each again is four-fold: temporary, constant, habitual, and natural.

140-143. One should know the mental offences by studying the eyes, mouth, expressions and feelings, etc., the physical by the actions and the vocal by harsh words, and those arising from intercourse by studying the companionships; study the magnitude and levity of each, and mete out punishments for the works that have been or are being committed.

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[1] This is the exact opposite of the dictum 'The king can do no wrong.'

[2] The Commonwealth follows the king in all respects. Hence his great responsibility.

[3] This is a very important warning to the holders of personal governments, *e.g.*, dukes, feudal lords, Zemindars, absolute monarchs, &c.

[1]144-146. The good man committing first offence deserves the following punishment. One should ask of him: 'Is this *your* evil action? Is it proper for you?' He deserves this sort of reproach twice or thrice.

147-149. The good man committing second offence (of the second character) deserves the punishment for the first; and this intensified according to gradual increase in magnitude.

[2]150-152. The good man committing serious offence (of a vile character) deserves the punishment for the first and second as described above and then should be bound.

153. This punishment is to be dealt out if there has been no intentional murder.

[3]154. Three classes of punishments are here described—good, middling, and low.

155-158. The second class man who is remarkable for good qualities, family and riches when committing first class offence deserves the punishment of censure, half punishment or full punishment in succession, and that twice or thrice, and at last imprisonment and menial work.

159-161. The second class man committing second class offence deserves the punishment twice that described in the case of the first offence, oppression, imprisonment and last of all, expulsion from the State and marking on the body.

[4]162-164. The second class man committing third class offence (vile) deserves the punishment described for the second offence, then twice or thrice that, and last of all, imprisonment for life.

165-166. The worst class man committing first offence deserves

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[1] साहस—Offence. If the man is good and if this be his first offence, he deserves only a censure or moral reprobation.

[2] The उत्तम or good man deserves the three kinds of punishment described above for commission of three kinds of offences, *viz.*, प्रथम (First), मध्यम (Second), अधम (vile).

[3] The उत्तम धिग्दण्ड punishment for the प्रथम offence of उत्तम or good man.

मध्यम	मध्यम
नीच	उत्तम

Thus the good man may also get the lowest punishment. The good punishment of the good man for the first offence is धिग्दण्ड, *i. e.*, punishment of censure only.

[4] The मध्यम (second class) man deserves three kinds of punishment for commission of hree kinds of offences just as the उत्तम man does.

the punishment half of what has been described or twice or thrice and then imprisonment.

167-169. The worst class committing second offence deserves twice the punishment for the first, then imprisonment for repairing roads.

[1]170-172. The worst class committing worst offence deserves twice the punishment for the second, imprisonment for life, only the menial works.

173-174. The king should take away a quarter of the wealth of the man who is proud of his wealth, then one-half, then full and lastly imprisonment for life.

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[1] The अधम (worst class) man also deserves three kinds of punishments for three kinds of offences.

Thus offences are of three kinds—प्रथम मध्यस उत्तम. Men are of three kinds--उत्तम, मध्यम, अधम

Punishments are of three kinds in each case according to three offences of each. So there are altogether nine kinds of punishments. The following table will illustrate the grades of persons and punishments and offences :—

Grade of offender.	Class of offence	Grade of Punishment.
1. उत्तम	1. प्रथम	1. उत्तम, *e. g.*, धिग्दण्ड, *i.e.*, moral censure
2. उत्तम	2. मध्यम	2. मध्यम repetition of धिग्दण्ड intensified.
3. उत्तम	3. उत्तम	3. नीच, *e.g.*, (i) repetition of the first and second, also (ii) बन्धन (imprisonment).
4. मध्यम	1. प्रथम	1. (i) धिग्दण्ड (censure). (ii) अर्द्धदण्ड * (half punishment). (iii) पूर्णदण्ड * (Full punishment . (iv) Twice or thrice each. (v) Imprisonment. (vi) Rigors of a lower order.
5. मध्यम	मध्यम	2. (i) Twice the first. (ii) ताड़न (Repression). (iii) बन्धन (Imprisonment). (iv) Expulsion and (v) ताडण (marking on the body).
	3. उत्तम	3. (i) The second as described above. (ii) Twice or thrice that. (iii) Imprisonment for life.
7. अधम	1. प्रथम	1. (i) अर्द्धदण्ड. (ii) Twice or thrice अर्द्धदण्ड (iii) Imprisonment.
8. अधम	2. मध्यम	2. (i) The first. (ii) Twice that. (iii) Imprisonment (iv) Repair of roads.
9. अधम	अधम	3. (i) The second described above. (ii) Twice that. (iii) Imprisonment for life. (iv) Rigors of a lower order.

अर्द्धदण्ड and पूर्णदण्ड have not been explained. These seem to be technical terms.

175-177. The king should bind and restrain the man who commits sins out of vanity for his men, learning and strength.

178-179. The wife, the son, the sister, the pupil, the servant and the brother committing sins are to be punished by slender cords on the back of the body but never on the forepart.

180. Beating otherwise one deserves punishment as a thief.

181-183. One who commits sins should be imprisoned and made to perform ignoble works for a month, three months, six months, one year or for whole life, but should not be killed.

184. One should not kill living beings—this is the truth of *Śruti.*

185-186. So the king should carefully avoid capital punishment but restrain by detention, imprisonment, and repression.

187-188. The king should not through greed inflict on his subjects a monetary punishment. Parents without help are not to be punished though offenders.

189-190. The punishments of the merciful king are of this type. But when the severe punisher who takes away wealth never forgives offences, the people get exasperated and are alienated by others.

191. So the king should be merciful and inflict punishment with care.

192-194. The drunkard, the gambler, the thief, the paramour, the envious, the man who has abandoned the customs and practices of the social system (castes and stages), the atheist, the cheat,

195-196. the man who curses uselessly, the informer who whispers into one's ears, the abuser of the Âryas and gods, the speaker of untruths, the man who destroys security or pawn, the destroyer of occupations,

197-198. the man who cannot bear the rise or prosperity of others, the man who takes bribes, the man who does things prejudicial to the *mantras*, the man who frustrates activities,

199-200. the man who says unpleasant things, and utters cruel and harsh words, the man who obstructs waters and parks, the pseudo-astrologer, the king's enemy, the bad minister, the man who knows tricks and stratagems,

201-202. the bad physician, the man whose habits are impure and harmful, the man who obstructs public roads, the bad witness, the man of immodest dress, the enemy of the master, and the extravagant,

203-204. the man who sets fire on houses, the poisoner, one who is addicted to prostitutes, the severe punisher, the biassed councillor, the man who receives written statements by force, 205-206. the man who commits wrongs, the quarrelsome, the man who flies from the battle, one who tampers with witnesses, the abuser of parents, chaste women and friends,

207-208. the malicious man, the helper of enemies, one who gives pain, the cheat, one who hates his own (people), one whose activities are secret, the heterodox, one who is the thorn of the village,

[1]209-210. the man who pursues penances and learning without maintaining relatives, one who lives on alms though capable of collecting wood and grasses,

211-212. the seller of daughters, one who diminishes the resources of kith and kin, one who does not publish sinful actions, and one who is indifferent to the losses of the king,

213-214. the prostitute, the murderer of husband and children, the woman who is a lover of separation, the woman who is disrespected by the old people, the woman who deserts domestic duties, the woman who is ever committing misdeeds, and the son's wife who is not his beloved ;

[2]215-216. knowing these persons who are wicked by nature the king should expel them from the commonwealth. They should be bound and transported to islands or forts, and employed in the work of repairing roads and made to live on insufficient and bad diet.

217-218. Or the king might make each prisoner work according to the qualifications of his caste.

219-220. The king should punish such bad men and also those who have been vitiated by bad company and teach them good ways of life.

221-222. The king should immediately extirpate those who desire evil of the commonwealth, the king, and the ministers by association with enemies.

223-224. The king should not destroy a gang or community all at once if there be a whole group of offenders, but should extirpate them one by one, just as the calf sucks the teats of the mother-cow individually.

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[1] Able-bodied persons who can earn their living by service or at any rate occupations of the lower economic order, *e. g.*, selling wood and grasses collected from forests—but yet choose to live on alms 'Sturdy beggars' as they are called.

[2] The enumeration of the offenders in the above lines gives a vivid picture of the darker side of human society which exists in every age and every clime. *Śukranîti* like all other Hindu *Nîti Śástras*, *Purâṇas* and *Tantras* is full of such vivid pictures of Hindu social life. मार्गसंस्करण The work of repairing roads seems to have been a common method of employing offenders and criminals. *Śukranîti* makes frequent mention of it. द्वीप Islands used as convict settlements.

[1]225-226. When the king is addicted to immoral ways people should terrify him by taking the help of virtuous and powerful enemies.

227-228. So long as the man is virtuous, only so long is the king. Otherwise both the king and the people are ruined.

229-230. The king should bind down those men in chains and appoint them in the work of repairing roads who wander about by forsaking parents and wives.

231. And the king should pay them (daily) half their wages.

232. The punishment for worst offence is one thousand *paṇas.*

233. A *paṇa* is a piece of copper coined by the king weighing ten *mâshâs.*

234. A *Kârshâpaṇa* is the value of one hundred and fifty ***varâtis*** (*cowries*).

235. The *madhyama* or second punishment is half of one thousand *paṇâs*, and the *prathama* or first punishment is half of that, *i.e.*, 250 *paṇas.*

236-237. For the first offence first punishment is to be inflicted by the king and for the two others two other punishments, *e.g.*, *madhyama* punishment for the *madhyama* offence and *uttama* punishment for the *uttama.*

238. In this miscellaneous chapter have been described the friends, neutrals and enemies with all their auxiliaries.

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[1] It is in this way that neighbours influence and greatly modify the internal policies and conditions of states. The overthrow of rulers by subjects in alliance with the recognised enemies is too common a phenomenon to be overlooked by such a shrewd observer as Śukrâchârya.

SECTION II.

TREASURE.

1-2. Now in this miscellaneous chapter I shall speak of the second section, *viz.*, that on Treasure. A Collection of wealth by one person is called treasure.

3-4. The king should collect funds by hook or by crook and maintain thereby the commonwealth, the army as well as sacrifices.

5-6. The collection of treasure is for the maintenance of the army and the subjects and for the performance of sacrifices. This leads to king's happiness in this life and hereafter, otherwise to misery.

7-8. The collection that is made for wife and children as well as for self-enjoyments leads to hell and does not give happiness hereafter.

9. That which is earned wrongfully is the cause of sin.

10. That wealth increases which is taken from, or given to, good persons.

11. The good or deserving person is he who earns well and spends well. And the undeserving person is he who is the opposite.

12. The king who takes away all the wealth of the undeserving is not a sinner.

13-14. One should take away by craft or force or by robbery, wealth of the king who is addicted to immoral ways of life—and also from other kingdoms.

15-16. His kingdom is destroyed by enemies who has amassed wealth by forsaking morality and by oppressing his own people.

17-18. In normal times the king should not increase his treasure by augmenting the punishments, land revenues and duties, and by taking dues from holy places and properties consecrated to divine purposes.

[1]19-20. When the king is preparing to maintain an army to destroy the enemy, he should receive from the people special grants of fines, duties, &c.

[2]21-22. The king should receive the wealth of the rich men in times of danger by supplying them wherewith to live. But when he is free from danger he should return the amount to them together with interest.

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[1] **Enhanced collections are allowable only under exceptional circumstances.**

[2] **सुवृद्धिकं - Loans are prescribed from rich persons in difficult times. These, however, should be repaid as soon as the danger is over together with interest.**

23. Otherwise the subjects, state, treasure and the king—all are ruined.

24. Kings like *Suratha* were reduced through severity of punishments inflicted by them.

[1]25-27. The treasure should be so governed that it may maintain the subjects, and that the army may be maintained for twenty years without fines, land revenues and duties.

28-29. The treasure is the root of the army, and the army is the root of the treasure. It is by maintaining the army that the treasure and the kingdom prosper and the enemy is destroyed.

30. And by protecting the subjects, all these three results accrue as well as the acquisitions of heaven.

31-32. Goods are produced for sacrifice, sacrifices lead to happiness, heaven and long life. Absence of enemies, army and treasure—these three lead to prosperity of the state.

33-34. The state also prospers through the mercifulness of the king and his virtue and intelligence. So one should strive.

35-38. The best king is he who, by following the practice of the weaver of garlands, protects his subjects, makes the enemies tributaries and increases the treasure by their wealth. The middling king is he who does this by following the practice of the Vaiśya. And the worst by service and receipts from fines, holy places and lands consecrated to gods.

39-40. Subjects whose wealth is little should be maintained, and officers whose wealth is moderate. Also officers whose wealth is considerable.

41. But the rich men whose wealth is excessive, and those who are richer than the king but of low character are not to be maintained.

42-44. That wealth is said to be low which is sufficient for twelve years. That is said to be *madhyama* or middling which is enough for sixteen years, And good wealth is that which is sufficient for thirty years.

45. The king should deposit this wealth with the rich persons in order in times of danger.

46-48. Merchants trade with their capital, not with interest. They sell when prices are high and store by when prices are low.

49. Otherwise the discontent of his own subjects destroys the king with his whole family.

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[1] **Sinews of war for twenty years should be reserved. Deposits for military expenditure are state necessities.**

50-52. Grains should be collected sufficient to meet the wants of three years in proper seasons by the king for his own good as well as for that of the commonwealth. Or for more than three years in case of well-established families provided the grain be long lasting.

53-55. The king should store up those grains that are well developed, bright, best of the species, dry, new, or have good colour, smell and taste, the famous ones, durable and the dear ones—not others.

56-57. He should not preserve those that have been attacked by poisons, fire or snows or eaten by worms and insects, or those that have been hollowed out, but should use them for immediate consumptions.

58-59. And the king should carefully replace every year by new instalments the exact amounts of those consumed.

60-63. The accumulation of all these things that are useful and instrumental for the purposes of man, *e.g.*, medicinal plants, minerals, grasses, woods, implements, arms, weapons, gunpowder, vessels and cloths, etc., should also be made—This is likely to be efficacious.

64-65. The king should also carefully preserve the wealth that has been collected. There is great trouble in the earning, four-fold difficulty in the maintenance (of wealth).

66. That which is disregarded for a moment is soon destroyed.

67-68. It is the earner who gets pain when the accumulated wealth is destroyed. Even wife and children do not feel that, how could others?

69-70. If one is negligent in his own duties, will not others be so? But if one is mindful of his own business others become his assistants as well as equals.

71-72. There is no greater fool than the man who knows how to earn but not to maintain what has been earned. Vain is his exertion in earning.

73-76. The following men are also fools:—

The man who has two living wives, who trusts people overmuch, who hopes for great wealth, the idler, the man overpowered by women, and one who calls upon thieves, paramours and enemies as witnesses.

77-78. One should keep his wealth like a miser and give away at times, as it were, unconcerned; otherwise he displays his foolishness even in the matter of spending his own wealth.

79-80. One should always try to understand the real nature of goods. And the king should keep the jewels after having them tested by experts as well as by himself.

81-83. The nine *mahâratnas* or great jewels enumerated by the wise are *vajra* (diamond), *muktâ* (pearl), *pravâla* (coral), *gomeda* (agate), *indranîla* (sapphire), *vaiduryya* (*Lapis lazuli*), *pushyarâga* (topaz), *pâchi* (emerald), *mâṇikya* (ruby).

84. *Mâṇikya* is the Sun's favourite, of red colour and has the bright lustre of *indragopa* insect.

85. *Muktâ* is the Moon's favourite, of red, yellow, white and *shyama* (greenish blue) colour.

86. *Vidruma* (*pravâla*, coral) is the Mars' favourite and has a yellowish red colour.

87. *Pâchi* is the Mercury's favourite and has the lustre of the feathers of the peacock or the *châsha* bird.

88. *Pushyarâga* is the Jupiter's favourite, is yellow and has the lustre of gold.

89. *Vajra* is the poet's (Sukra or Venus) favourite, very transparent and has the lustre of the Star.

90. *Indranîla* is the Saturn's favourite, not white, and has the colour of black clouds.

91. *Gomeda* is the Râhu's favourite and has yellowish red colour.

92. *Vaiduryya* is the Ketu's favourite, has the lustre of cat's eyes and has its particles moving.

93-95. *Vajra* is the best gem, lower are the *gomeda* and *vidruma*. *Gârutmata* (Marakata or *pachi*), *mâṇikya*, and *muktâ* are good. *Indranîla*, *pushyarâga*, and *vaiduryya* are middling.

96. The gem on the head of the snake is the best of all, of great splendour but very rare.

97-98. These who are experts in the study of gems describe that gem as the best which has no pores, has good colour, is without scratches and spots, has good angles and bright lustre.

99. Gems may have the colour of *śarkarâ* (powdered bricks) or the leaves of trees, and may be flat or round in shape.

100. The colour and lustre of gems may be white, red, yellow and black.

101-103. The gem that has its appropriate colour and lustre and is devoid of any defects is beneficial to beauty, growth, fame, valour, and life. Others are known to be injurious. The lustre reveals the colour, while the shade depends on colour.

104. *Padmarâga* is a species of *mâṇikya* and has the lustre of red lotus.

105. The woman who wants a son should never wear a diamond.

106. The pearl and the coral fade through use in time.

107-108. The gem that is devoid of any defect has its value increased according to its weight, lustre, colour, extent, receptacle, and shape.

109-110. The gems cannot be cut by iron except by pearls and corals and stones (diamonds). This is said by those who are experts in gems.

111-112. The gem that is light in weight but large in size has great value. But that though having good qualities which is heavy in weight but small in size has small value.

113-114. That which has the lustre of *sarkarâ* (red powder of bricks) has the smallest value, that which is flat has middling value, that having the lustre of leaves has the greatest value. The round ones are valued according to demand.

115-116. The gems cannot deteriorate except pearls and corals. But their prices can rise or fall through the wickedness of kings.

117-118. Pearls grow in fishes, snakes, conches, hogs, bamboos, clouds and shells; of these the greatest amount is said to come from shells.

119-120. The following is the ascending order of excellence of pearls: those with black colour, white colour, yellow and red colour, those having two, four or seven coverings and those with three, five and seven coverings.

121. The pearls that are black, white, red and yellow are known to be old in succession.

122. The pearls derived from shells are known to be young, middling and excellent.

123. These alone can be pierced, not others.

[1]124. The people of the island of Ceylon can make artificial pearls like these.

125. To remove that doubt one should carefully examine the pearls.

126-128. That certainly is not artificial which does not lose colour by being rubbed with *brîhi* paddy after having been soaked in hot saline water during the night. If it remains very bright it is really derived from shells. If it has middling lustre it is otherwise.

129. The gems have their value measured by weight excepting the *gomeda* a gem brought from the Himâlaya and Indus, described as of four different colours :—white, pale-yellow, red and dark blue.

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[1] **An economic fact of historic importance. The Ceylonese used to commit fraud in pearl industry.**

130-132. Excepting pearls the *rati* of all gems is made by twenty *Kshumâs*. Three *ratis* of pearls, however, are made by four *krishnalas*. Twenty-four *ratis* make one *ratnatanka*.

[1]133. Four *tankas* make one *tola* in the case of gold and corals.

134-135. The price of one whole *vajra* (diamond) weighing one *rati* but wide in extent is five *suvarṇas* or gold coins.

136. The price is five times (*i. e.*, twenty-five gold coins) if it be heavier than one *rati* and superior in extent.

137. The price is to be less and less according as the quality falls off.

138. Eight *ratis* make one *mâshâ*, ten *mâshâs* make one *suvarṇa*.

[2]139. Five times that *suvarṇa* make eighty silver *Karshakas*.

140-142. The value of diamond is according to its weight in terms of *rati*. The value of the flat diamond is one-third less, and of that having the colour of red powder of bricks is one-half.

143-144. Two diamonds weighing (together) one *rati* are valued at half the (original) price. Those that are middling or inferior deserve half this price (*i. e.*, one-fourth of the original price.)

145-148. According to the inferiority of quality, the value of a diamond may be half or a quarter of a first class one. Multiplying the weight in *ratis* by nine-sixteenths, would be the value of an inferior one. Similarly, five-sixteenths *plus* one-thirteenth would be the value of smaller diamonds.

149-155. Pearls.—The value of pearls is to be estimated according as it is of the first, middling or inferior quality. If the pearl is of more than a thousand *ratis* in weight, then for every hundred *ratis*, the value would be the same as of a diamond, less three hundred divided by sixteen. From the weight of pearls above 100 *ratis*, deduct 20 *ratis* for every 100 *ratis*, after such deduction, the value of each *rati* will be that of the first class diamond. For the flattened pearl, the value will be that of a flattened diamond, after similar deduction.

156. One should never wear gems that have black or red spots.

157. The *gârutmata* or emerald, if it is good, deserves the price of *mânikya* or ruby.

[3]158. Gold, when compared with *rati*, has to be measured in terms of its weight.

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[1] The standard of measurement of gems :—20 क्षमा = 1 रवि (excepting pearls). 4 कृष्णल = 3 रवि (pearls). 24 रवि = 1 टङ्क. 4 टङ्क = 1 तोला (of gold and corals).

[2] 8 रत्ति = 1 माष. 10 माष = 1 सुवर्ण. 5 सुवर्ण = 80 कर्षक.

[3] It is not the size but the weight of the *rati* that is to be compared with gold and used in its measurement,

159. The *pushyarâga* weighting one *rati* deserves half the price of *Indranila* or *gold* (of the same weight).

160. The *vaiduryya* whose three rays are coming out deserves high price.

161. Corals weighing one *tola* deserve half the price of the gold (of the same weight).

162. *Gomeda* does not deserve weighing, as it is very low priced.

[1]163. Excepting diamonds the value of small gems has to be determined by number (not weight).

[2]164. But that of very fine and rare ones is to be determined by fancy (demand).

[3]165. So also the price of very fine things has not to be determined by weight.

166-167. Multiply the weight of the pearl in *ratis* by 14¼ and divide the product by 24, the quotient will be the value of the pearl in so many *ratis* of gold.

168-170. The best pearls are valued at half the price of gold, and the inferior ones in proportion to their quality. The best pearls are the red, yellow, round and white. The worst are the flat and those having the colour of powdered bricks. The rest are middling.

171-172. There are natural defects in gems, but metals have artificial defects. So the wise man should determine their value by carefully examining them.

173-175. Gold, Silver, Copper, Zinc, Lead, Tin, and Iron—these are the seven metals. Others are mixtures (alloys). They are superior according to their place in the above enumeration, gold being the best.

176. Bronze is the alloy of Zinc and Copper, *pitala* (Brass) of Copper and Tin.

[4]177. Gold of the same weight (as other metals) is small in volume. Others are bulky.

178-179. If two pieces of a metal—one a pure and another suspected of alloy—be successively passed through the same whole, and threads of equal lengths be drawn out of them, and weighed, and if the weights of each are equal, then the metal is unalloyed, otherwise not.

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[1] Even the smallest particles of हीरक or diamond have to be valued by weight. But others are valued by counting, if of very small size.

[2] काम Desire, fancy, demand has been regarded as the determinant of value in the case of all rare and fanciful things.

[3] There is a 'Fancy price' for all these things as would be said by moderners.

[4] Ratio of gold to other metals: The density of gold is high, hence great weight in small bulk.

180. Iron in the form of tool, implements and weapons is very valuable.

181. The value of Gold is sixteen times that of Silver.

182. The value of Silver is almost eighty times that of Copper.

183-184. The value of Copper is one and a half time that of Zinc. The value of Zinc is twice that of Tin, and thrice that of Lead. The value of Copper is six times that of Iron.

[1]185. These are the special remarks on value. General remarks have been already made.

186-187. The cow with good horns and fine colour, which gives plenty of sweet milk, and has good calves has very high value whether young, small or big.

[2]188. The price of a cow which has calves and which gives one *prastha* of milk is one silver pala.

189. The value of a she-goat is half that of the cow, that of the female sheep half that of the she-goat.

190. The price of a strong and fighting sheep is a silver *pala* (eight rupees.)

191. The high price for cows is eight or ten silver *palas* (*i.e.*, sixty-four or eighty rupees.)

192. The high price of the she-goat and the female sheep is one silver *pala* (*i.e.*, eight rupees.)

193. The high price of the buffalo is the same as that of the cow or one and a half time that.

[3]194-195. The price of the bull with good horns, fair colour, and sufficient strength, which can carry burdens and can walk fast, and which has the height of eight *tâlas* is sixty *palas* (or four-hundred and eighty rupees.)

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[1] The relation between the metals in value :—

Gold = 16 Silver.
Silver = 80 Copper.
Copper = 1½ Zinc.
Zinc = 2 Tin.
" = 3 Lead.
Copper = 6 Iron.

[2] प्रस्थ—a measure already described as liquid standard about four seers. पल –8 तोला. So the price would be 8 silver rupees.

[3] तोल already described.

196. The high price for she-buffaloes is seven or eight palas (fifty-six or sixty-four rupees).

197. The high price for horses and elephants is two, three or four thousand (*palas*).

198. The high price of camels is known to be that of the buffalo.

[1]199-200. The good horse is that which can go one hundred *Yojanas* in one day. Its price is five hundred gold (eight thousand silver rupees).

201-202. The good camel is that which can go thirty *Yojanas* in one day. Its price is one hundred silver *palas* (eight hundred rupees).

203-204. The elephant that is unrivalled in strength, height, fight and *mada* (rut) is priced at two thousand *Nishkas*.

205. *Nishka* is the value of gold weighing four *mâshâs*.

[2]206. And in estimating the value of elephants five *ratis* make one *mâshâ*.

207. Those which are rare in this world are priced as gems.

[3]208. One should fix the price according to Time and Space.

209. There is no price for worthless things that cannot be used for any purposes.

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[1] योजन-5 miles according to Sukra, 8 miles generally.

[2] The price of the best elephant is therefore 8,000 *mâshâs* of gold or 40,000 *ratis* of gold or 640,000 *ratis* of silver or $\frac{640,000}{96}$ *tolâs* or silver ($\frac{40,000}{6}$ = 6,666 rupees) = Rs. 6,666 approximately.

[3] The mention of prices and ratios in the above lines gives a good statistics which might be used as the basis for the formation of an *Index Number*.

Ordinary prices :—

Cow	=	1 pala silver	=	8 tolas or rupees.
She-goat	=	½ cow	=	4 tolas or rupees.
She-sheep	=	½ goat	=	2 tolas or rupees.
Sheep	=	1 pala silver	=	8 tolas or rupees.
Elephant or horse	=		=	2,000, 3,000, or 4,000 rupees.
Camel	=	Buffalo	=	56 or 64 rupees.

igh prices for best things :—

Cow	=	8 or 10 palas silver	=	64 or 80 rupees.
She-goat	=	1 pala silver	=	8 rupees.
She-sheep	=	1 pala silver	=	8 rupees.
She-buffalo	=	Cow or 1½ cow	=	64 or 80, or 96 or 120 rupees.
Bull	=	60 palas silver	=	480 rupees.
Buffalo	=	7 or 8 palas	=	56 or 64 rupees.
Best horse	=	500 gold	=	8,000 rupees.
Best camel	=	100 silver palas	=	800 rupees.
Elephant	=	2,000 gold Nishkas	=	6,666 rupees.

210-211. And there are a high price, low price and middling price in the valuation of all things. This is to be always considered by wise people.

212. *Sulka* or Duty is the king's share received from the buyer and the seller.

213. The regions of Sulka or Duty are the market places, streets and mines

214. Duties are to be levied on goods only once.

215. The duty should not be realised more than once by the king through craft.

216. The king should receive the thirty-second portion from the seller or buyer.

[1]217. The twentieth or sixteenth part, as the duty, is not a drawback upon the price.

218. The king should not realise duty from the seller when he receives what is less than or just equal to the cost.

[2]219. He should receive it from the buyer after seeing that he is a gainer.

220-221. Having ascertained the amount of produce from the measured plots of land, whether great, middling or small, the king should desire revenue and then apportion it among them.

[3]222 223. The king should receive rent from the peasant in such a way that he be not destroyed. It is to be realised in the fashion of the weaver of the garland not of the coal merchant.

224-226. That agriculture is successful which yields a profit twice the expenditure (including Government demand) after duly considering the variations in actual produce, *e. g.*, great, middling or small. Any thing less than that is unsatisfactory.

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[1] Even a twentieth or sixteenth part of the price of a commodity is a fair and legitimate duty.

[2] If the seller has to give the commodity at a loss no duty is to be realised from him but it is to be realised from the buyer.

A good maxim of public finance. But how is that to be done? So also it is very difficult to carry out in practice the rule that duty should be realised only once on every commodity. For it may be bought and sold many times.

[3] The coal merchant sets fire to the woods to make charcoal and thus destroys the whole property. But the weaver of garlands plucks from the trees only those flowers which are full blown and preserves the rest as well as the trees for future use.

[1]*227-229. The king should realise one-third, one-fourth, or one-half from places which are irrigated by tanks, canals and wells, by rains and by rivers, respectively.*

230. He should have one-sixth from barren and rocky soils.

231-232. If the king gets one hundred silver *karshas* from the cultivator he should give back to him twenty *karshas.*

[2]233-235. The king should realise from minerals at the following rates: half of gold, one-third of silver, one-fourth of copper, one-sixth of zinc and iron, half of gems, half of glass and lead; after the expenses have been met.

236. The king should realise from peasants, &c., after noticing the amount of profits.

237-238. He should realise one-third, one-fifth, one-seventh, one-tenth, or one-twentieth from the collectors of grasses and woods, &c.

[3]239-240. He should have one-eighth of the increase of goats, sheep, cows, buffaloes, and horses, and one-sixteenth of the milk of she-buffaloes, she-goats and female sheep.

241. The king should make the artists and artisans work one day in the fortnight.

[4]242-244. If people undertake new industries or cultivate new lands and dig tanks, canals, wells, &c., for their good, the king should not demand any thing of them until they realise profit twice the expenditure.

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[1] मातृकात्.—These things are the mothers of the lands.

देव—The gods or natural agencies are the mothers of certain regions—*e. g.*, by supplying rain.

नदी—Rivers are also irrigators. Lands and countries are called the daughters or gifts of rivers.

Where rivers are mothers or irrigators, the cultivation is certain—and hence $\frac{1}{2}$ may be taken as Government revenue. Where rain is the source of moisture, agriculture is precarious and uncertain. Hence the demand of the Government is to be very small. But where the tanks and artificial water supplies are the irrigators, cultivation is very difficult and expensive though certain. Hence the Government demand should be midway between the other two cases.

[2] व्ययशेष, *&c. —The proportion mentioned above* to be received from the remainder after paying the cost of extraction and production.

[3] These are levies in kind.

[4] That is, they should have remissions and suspensions of revenue for periods. This is how waste lands are to be improved and new enterprises encouraged. Here is an application of the principle of Partial Protection. *Śukrāchāryya* is thus definitely an advocate of the "*Young Industry*" argument.

245-246. The king should promptly realise the land revenues, wages, duties, interests, bribes, and rents without any delay.

247. The king should give to each cultivator the deed of rent having his own mark (seal).

[1]248-250. Having determined the land revenue of the village the king should receive it from one rich man in advance, or guarantee [for the payment] of that either by monthly or periodical instalments.

251-252. Or the king should appoint officers called *grâmapas* by paying one-sixteenth, one-twelfth, one-eighth or one-sixth of his own receipts

253-254. The king should receive milk of cows, &c., rice, for the kith and kin but should not receive paddy and clothes from buyers for his own enjoyment.

[2]255. The king should realise one thirty-second portion of the increase or interest of the usurer.

256. He should receive rents from houses and abodes as from cultivated lands.

[3]257. He should also have land tax from shopkeepers.

258. For the preservation and repair of the streets, he should have dues from those who use the streets.

259. The king should thus enjoy fruits everywhere but should protect all like a servant.

260. Thus has been described in brief the section on treasure.

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[1] Having divided the whole land into several proprietorships, the king should collect the revenue from and through one man who is to be responsible for the total dues of the village.

[2] वार्धुषिक One who lives upon increase.

[3] Land for houses and buildings is to be taxed at the same rate as that for cultivation. Land for stalls also should be taxed. The sellers have to pay duties not only for the commodities sold but also for the use of the land.

SECTION III.

THE ARTS AND SCIENCES.

1. Now in the Miscellaneous Chapter I shall describe the third Section of *Râṣṭra* or Commonwealth.

2. Both immovable and movable things are indicated by the term ***Râṣṭra.***

3. The *Râṣṭra* belongs to him under whose submission it comes.

[1]4-5. *Kuveratâ* (possession of wealth) is hundred times superior to all the qualities. *Îṣatâ* (overlordship) is superior to that. It is the result of no mean penances.

6. The Sovereign flourishes in this world as a God, none others.

7. Men are protected by him and the subjects behave like him.

8-10. The man in whose kingdom people follow their own duties enjoys fully the result of his sovereignty, enjoys fame for ever.

11-12. A man lives in heaven who gets fame in this world. Disrepute is real hell. There is no other hell in this world.

13-14. Any other body (?) besides human body is hell. One should know the calamities and diseases to be the effects of sins.

15. So being himself dutiful the king should appoint the subjects to their own duties.

16. So the subjects always approach a king who is religious and authoritative.

[2]17-19. The local customs, the social customs and the domestic customs, those duties that have been prescribed as eternal and universal by the sages, the old and the new regulations—all these are to be carefully observed by the king for the protection of the realm.

20. The king achieves fame and wealth by maintaining virtue.

21. In ancient times the castes were divided into four classes by Brahmâ according to their activities.

[3]22-23. Owing to their intermixtures, both *anuloma* and *pratiloma*, an infinitude of castes has been created which it is difficult to explain.

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[1] The sovereignty or possession of authority over others is the most desirable thing and the result of great virtues.

[2] The धर्म्म may vary with time, place, race and family. So the good king should observe and respect all.

[3] अनुलोम--If a man of the higher caste marries a woman of the lower the intermixture would be called अनुलोम. प्रतिलोम—If a man of the lower caste marries a woman of the higher caste the Sânkaryya or intermixture would be प्रतिलोम.

24-25. Those who know of caste differences by birth can tell of differences in name and activity.

26. The castes may be summarised as *jarâyuja* or born of foetus, *aṇḍaja* or born from eggs, *swedaja* or born from drops of perspiration and *udvijja* or plants.

27-28. The man who is good by birth becomes low by low associations. But the man who is low by birth cannot be high by associations.

29. But in course of time through work as well as attributes high and low orders are created.

[1]30. *Jâti* or caste is described by learning or occupation.

[2]31. Sacrifice, study and charity are the functions of the *Dwijanma*, *i.e.*, the twice-born.

[3]32. The additional (special) functions of Brâhmaṇas are begging, teaching and *Yâjana* (conducting a sacrifice).

33. The additional (special) functions of Kṣatriyas are protection of the good, suppression of the wicked and realization of revenues.

34. The additional (special) functions of the Vaiśyas are agriculture, pasture and commerce.

35. The lower functions of Śûdras are charity and service.

36. The remuneration and means of livelihood of the various classes vary according to difference of functions.

37. For Brâhmaṇas, agriculture by tilling the soil has been prescribed by Manu and other masters.

[4]38-39. Sixteen cows have to be employed to their ploughs by Brâhmaṇas, four less by the others. Two cows by *antyajas* according to the softness of the soil.

40. Begging by anybody else besides Brâhmaṇas is to be condemned.

41-42. The whole Veda with interpretations has to be studied by the twice-born in connexion with various penances, and miscellaneous rites and ceremonies.

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[1] जाति—defined: (i) according to विद्या, *e.g.*, दार्शनिक जाति, the philosophers, botanists, &c., (ii) according to कला, art and industry, *i.e.*, occupation, *e.g.*, weaver.

[2] These functions are common to Brâhmaṇas, Kṣatriyas as well as Vaiśyas. Each, however, has special functions which are mentioned below.

[3] These special functions describe the various occupations for livelihood.

[4] Brâhmaṇas should have 16 cows to their ploughs.

Kṣatriyas	,,	12	,,	,,
Vaiśyas	,,	8	,,	,,
Śûdras	,,	4	,,	,,
Antyajas	,,	2	,,	,,

43-44. *The man who has mastered the sciences and the arts should be the preceptor of all. But one who is unlearned cannot be preceptor because of birth.*

45. The arts and sciences are infinite and cannot be enumerated.

46. The primary *Vidyâs* are thirty, and the primary arts are sixty-four.

[1]47-48. *Vidyâ* is known to be that which can be said. *Kalâ* is that which can be done by even the dumb.

49-50. The general characteristics have been mentioned, the special marks are being described separately, the names of the *Vidyâs* and *Kalâs.*

[2]51-52. *Ṛig, Yajus, Sâma, Atharvan* are the Vedas; *Âyus, Dhanus, Gândharva,* as well as *Tantras* are the *Upavedas.*

53-54. The six Aṅgas of the Vedas are Śikṣâ (Pronunciation), Vyâkaraṇa (Grammar), Kalpa (Rituals), Nirukta (Etymology), Jyotiṣ (Astronomy) and Chhandas (Prosody).

[3]55-59. The Mîmâṃsâs, Tarka, Samkhya, Vedânta, Yoga, Itihâsas, Purâṇas, Smṛitis, theory of Sceptics, Artha Śâstra, Kâma Śâstra, Silpa

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[1] The distinction between Science and Art is the same as that between विद्या and कला.

[2] तन्त्र—Tantras are a section of the Vedic literature. So mere mention of तन्त्र does not point to a statement being that of very modern facts.

[3] The specially noticeable points are the facts that इतिहासs are quite distinct from पुराणs, that the theories of नास्तिकs as well as Yavanas are mentioned as branches of learning, and देशभाषा as well as देशादिधर्म्म are also respected in the same breath with the Vedas and Vedântas.

The 32 Sciences are :

1.	Vedas	4
2.	Upavedas	4
3.	Vedâṅgas	6
4.	Darśanas	6
5.	Itihâsa	1
6.	Purâṇa	1
7.	Smṛiti	1
8.	Scepticism	1
9.	Artha Śâstra	1
10.	Kâma Śâstra	1
11.	Śilpa Śâstra	1
12.	Alaṅkâra	1
13.	Kâvya	1
14.	Deśabhâśâ	1
15.	Avasasokti	1
16.	Yavana Philosophy	1
	Total	32

Śâstra, Alaṅkâra (Rhetoric), Kâvyas, language of the folk (vernacular), the art of speaking properly, the theory of Yavanas, and manners and customs of countries and nations—these are the thirty-two Vidyâs.

60. The name of Mantras and Brâhmaṇas is Veda, *e.g.*, the Ṛig, etc.

61. The adorations and salutations according to these give satisfaction to the gods.

[1]62. The Mantras are so called because they are pronounced. Brâhmaṇas are those that apply these Mantras.

[2]63-64. The Ṛig portion of the Vedas is that in which the *mantras* or hymns are in praise of the gods, where the *mantras* are arranged in rhythmical form as quarter-verse or half-verse, and where the *mantras* are used for sacrifices.

[3]65-67. The Yajur-veda is that in which the *mantras* are read in any order without verse and music, in which the service of an Adhvaryyu or priest for conducting sacrifice is required and in which the *mantras* are to be read thrice.

68. The *Sâma* is that of which the *mantras* are sung in sacrifices.

69. *Atharvâṅgirasa* is that in which there is the relation between the adored and the adorer.

70. Thus has been described in brief the fourfold Veda.

[4]71-72. *Âyurveda* is that Upaveda of Ṛig-veda by which one knows and acquires health from a study of the physique and the medicines.

[5]73-74. *Dhanurveda* or Science of Archery is that *Upaveda* of Yajur-veda by which one can be proficient in fighting, the use of arms and weapons and the formation of battle arrays.

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[1] The two sections of the Vedas have been described here. They contain things by using which men may satisfy the gods. Of these, the portion that is recited is called *mantra*, and the portion that is done is called *Brahmaṇa*.

[2] The characteristics of Ṛig-veda :

(1) The *mantras* are to be in rhythmical form.

(2) The *mantras* are to be used for होम.

(3) The *mantras* are to be ऋगरूपा *i.e.*, in praise of gods.

[3] Like the Ṛig-veda the Yajur-veda has also three characteristics.

[4] आयुर्वेद has two functions—(1) वेत्ति *i.e.*, one can by its help know of आयु (life and health)—thus it is a science giving laws of health ; (2) विन्दति *i.e.*, one can by its help acquire (life and health)—thus an art. This branch of learning has also two Departments—(1) आकृति, study of the physique, *i.e* , anatomy and physiology ; (2) औषधि, Therapeutics and medicine.

[5] The whole military science comes under धनुर्वेद, not simply that of bows and arrows.

[1]75-76. *Gândharva*-veda is that science of music by which one can know of the various voices, *e.g.*, *udâtta*, *anudâtta*, &c., produced by instruments and the throat, together with the beats of time.

[2]77-79. *Tantra* is the Upaveda of *Atharva-veda* in which are described the six uses of the various *mantras* to the adored beings, as well as the various means of counteracting the effects of the *mantras*, together with the various rites and ceremonies.

[3]80-81. *Śikṣâ* is the science of the pronunciation of letters according to *Swara* (voice), *Kâla* (time), *Sthâna* (place), *Prayatna* (exercise of the muscles of the mouth), *Anupradâna* and *Savana* (origin).

[4]82-83. That portion of the *Brâhmaṇas* which contains rules about sacrifices is known to be *Śrauta kalpa*. *Smârta kalpa* is another (science).

84-85. *Vyâkarana* or Grammar is the science in which words are analysed according to their roots, inflexions, sandhis, samâsas and genders.

86-87. *Nirukta* is that which explains *Śavdas* or words and sentences. Hence this Vedâṅga is called the ear of the Vedas.

[5]88-89. *Jyotiṣa* is that science which measures time by studying the movements of planets and stars, the *Saṃhitâs*, *Horâ Sâstras* and *Gaṇitas*.

90-91. *Chhandas* is the science by which verses are constructed according to the rhythmical scheme *ma*, *ya*, *ra*, &c. It is like the foot of the Vedas.

[6]92-93. *Mîmâṃsâ* or *Nyâya* is that science by which the expressions of the Vedas are explained and interpreted according to the ceremonies in the Brâhmanas.

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[1] गान्धर्ववेद—Is thus the science of music both vocal कण्ठ and instrumental तन्त्री. It is most probably an Upaveda of Sâma-veda.

[2] तन्त्र—Has the following characteristics—(i) मन्त्रs to the उपास्य, (ii) Their six uses described, (iii) उपसंहार The methods of counteracting the effect produced by certain actions, (iv) धर्म्मनियम rites and observances to be followed in using or counteracting the *mantras*.

[3] स्वर—The voice is of three kinds,—*udâtta* (sharp tone), *anudâtta* (grave accent), *Swarita* (accented, pitched).

Pronunciation according to time is of three kinds—ह्रस्व (short), दीर्घ (long), प्लुत ("protracted or continuous sound being three times the length of a short vowel and occupying three moments in its utterance"—Wilson). सवन (origin).

[4] There are two Kalpas—(1) *Śrauta kalpa* which is a portion of the Vedas called वेदाङ्ग and (2) *Smârta kalpa* which is not a Vedâṅga but contains rules about things other इतर than यज्ञक, *i.e.*, Śrâddhas (funeral ceremonies), worship, &c., which are mentioned in the *Smṛitis*.

[5] *Jyotiṣa* is thus not mere astronomy, but (1) this together with other sciences, *viz.*, (2) *Saṃhitâ* (Bhṛigu, Parâśara, &c.), (3) *Horâ Śâstra*, (4) *Gaṇita* (Mathematics).

[6] It is the *Pûrva Mîmâṃsâ* which illustrates the Karmakâṇḍa of the Vedas.

94-95. (The *Vaiśeṣika* is that) which contains arguments about the existence or non-existence of material objects and which comes from *Kaṇâda* and others.

[1]96-97. *Saṃkhyâ* is that in which *Puruṣa*, eight *Prakṛitis*, sixteen *Vikâras* and other facts are specifically enumerated.

98-99. "*Brahma* exists alone without a second. The many do not exist. Every thing appears through ignorance and illusion"—this is the theory of those who follow *Vedânta.*

100-101. The *Yoga Śâstra* is that science by which the passions of the mind may be restrained by processes for regulating the breath movements, contemplation and meditation.

102-103. *Itihâsa* is that which narrates past events in and through the pretexts of the actions of kings.

[2]104-105. *Purâṇa* is that which contains an account of creation, destruction, the dynasties, the cycles or epochs and the incidents and events under each dynasty.

106-107. *Smṛiti* is that which investigates the castes and duties not at variance with the Vedas and describes the social and economic morals.

108-109. *Nâstika* theory or scepticism is that which advocates the predominance of Reason, the origin of all things from Nature (not from God) and the non-existence of the Vedas.

[3]110-111. *Artha Śâstra* is that science which describes the actions and administration of kings in accordance with the dictates of Śruti and Smṛiti, as well as the means of livelihood in a proper manner.

[4]112-114. *Kâma Śâstra* is that which describes the marks of living beings, both male and female, *e.g.*, of men according to their physical character and inward characteristics, and of women according to external and internal characteristics.

115-116. That science is said by the sages to be *Śilpa Śâstra* which treats of (the construction of) palaces, images, parks, houses, canals, and other good works.

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[1] प्रकृति "A radical form or predicament of being,—an illusion, intelligence, consciousness, and the five elements (*viz.*, Âkâśa, Fire, Earth, Air and Water.)"

[2] *Purâṇa* is thus more comprehensive than *Itihâsa.* The historian has to use the राजकृत्य as a mere peg on which to hang his accounts of ancient times.

[3] अर्थशास्त्र—Is thus a two-fold science, Politics as well as Economics.

[4] शशादि, &c.—Physical characteristics. The man is like a hare, शश, &c.

अनुकूल, &c.—Mental and moral characteristics. The man is favourable, &c.

पद्मिनी—Physical character of women. They are described as being like a lotus, &c.

स्वीय—One's own, etc. This refers to the mental and moral characteristics of women who may be स्वीय, परकीय, *i.e.*, egoistic, altruistic, &c.

117-118. *Alaṅkriti* or Rhetoric is that in which the attributes of objects are narrated as equal to, and less or greater than others, according to the varieties of analogy—contrast, simile or metaphor.

[1]119-120. *Kâvya* is that which appeals to the various tastes, has figures or ornaments, no defective terms, gives rise to much pleasure and is varied according to verse or prose.

[2]121-122. *Daiśiki* or local language is that which is intelligible by reference to common usage, and which serves the purpose without requiring the help of dictionaries and the guidance of Śâstras.

[3]123. *Avasarokti* is known to be that science which teaches the proper use of words and expressions at the proper time.

[4]124-126. *Yavana* philosophy is that which recognises God as the invisible creator of this universe, and recognises virtue and vice without reference to *Sruti* and *Smriti*, and which believes that *Śruti* contains a separate religious system.

[5]127-128. *Deśâdidharma* or custom is that which may trace its origin in the *Srutis* or may not, but is always followed by the people in different climes and families.

129. Thus have been described separately the marks of the various *Vidyâs*.

130-131. The *Kalâs* or arts have not only different names and marks but these differ according to the different functions.

132. The species of *Kalâ* is named after the function it serves (the work it does).

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[1] Five characteristics of काव्य,—(1) रसयुक्त. *i.e.*, it must embody the various sentiments, *e.g.*, *Śringâra* or love, *Hasya* or mirth, *Karuna* or tenderness, *Rudra* or anger, *Vîra* or heroism, *Bhayânaka* or terror, *Vibhatsa* or disgust, *Adbhuta* or surprise.

(2) अलङ्कारयुक्त—Figurative, full of images and similes.

(3) दोषरहित—Without any defect, *e.g.*, those of vulgarism, vagueness, archaism, &c.

(4) चमत्कारवीज Must give pleasure.

(5) पद्यादिभेदत: -May be both prose and verse.

[2] It is the ordinary language of the streets or Vernacular as it is called which does not require the use of Vedas, कोश, &c., but which can be understood by reference to लोकसङ्केत or common parlance.

[3] It is the art of saying the right thing at the right moment. It is thus a branch of diplomacy or etiquette.

[4] This, therefore, is not necessarily atheism, but what in modern times could be regarded as an alien and non-national religion.

[5] Custom—(1) by a sort of fiction (कल्पित) finds its origin in the *Śrutis*, (2) may not be traced to *Śrutis*, (3) respected by people, (4) varying with country and family. Thus there may be several देशधर्म्म. several कुलधर्म्म, &c., just as there may be local gods, family gods, etc.

133. *Nartan* or dancing with appropriate gestures and movements is an art.

134. *Vâdana* or playing on musical instruments is also an art.

135. The decoration of men and women by dress and ornaments is an art.

136. The performance and knowledge of the sundry mimicry and antics is an art.

137. The laying out of beds and furniture and the weaving of garlands, &c., constitute an art.

138-139. The entertainment of people by gambling and various tricks of magic is an art. The (knowledge of) different aspects of giving pleasure is an art.

140. These seven arts are called *Gândharva*.

141. The distillation of wines and spirituous liquors from flowers, &c., is an art.

142. The extrication of thorns and the relieving of pain by operating on the wounds of a vein constitute an art.

143. The cooking of food by intermixtures of various tastes is an art.

144. The planting, grafting and preservation of plants constitute an art.

145. The melting and powdering of stones and metals constitute an art.

146. The act of using preparations from sugarcanes is known to be an art.

[1]147. The knowledge of mixtures of metals and medicinal plants constitutes an art.

[2]148. The knowledge of the analysis and synthesis of metals constitutes an art.

149. The preparation of new substances (alloys) out of metals by combinations is an art.

150. The preparation of salts constitutes an art.

[3]151. These ten *Kalâs* are mentioned in *Âyurveda* and other (medical) sciences.

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[1] This refers to pharmaceutical preparations.

[2] सांकर्य—Combination or synthesis.

पार्थक्य—Analysis.

[3] The medical science must therefore have been very comprehensive, comprising so many arts, the preparation of alcohol, operation of wounds, cooking, gardening, metallurgy, pharmacy, and chemical processes and manipulations.

152. *The use and employment of arms by the proper arrangement of legs constitutes an art.*

153. Duelling by the various artifices is an art.

154. A *Vâhujuddha* or hand to hand fight is the combat between duellers without weapons.

155. The man who dies thereby does not attain heaven nor fame in this world.

156-157. The *Nijuddha* is meant for fame only, destruction of the enemy's power and vanity. A hand to hand fight should not lead to anybody's death.

158-60. An attack by duellers, that which is made by various dangerous artifices of hands, and by throwing down the opponent in various ways, &c.

[1]And *Pratikriyâ* is the method of extricating oneself from these.

[2]161. The throwing of arms and implements towards some fixed point is an art.

162. The formations of battle arrays according to the signals given by musical instruments (bugles) is an art.

163. The arrangement of horses, elephants and chariots in war is an art.

[3]164. These five arts are mentioned in *Dhanurveda* or the science of military tactics.

165. The propitiation of gods by various seats and postures is an art.

166. The act of driving horses and elephants is an art, as well as that of teaching them.

167-168. Earthen, wooden, stone and metal vessels give rise to four separate arts in the matter of their cleansing, polishing, dyeing or rinsing ; picture-drawing is also an art.

169. The construction of tanks, canals, palaces, and *squares* (?) is an art.

170. The construction of clocks, watches and musical instruments is an art.

171. The dyeing by the application of inferior, middling and other colours is an art.

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[1] Various feats in boxing are mentioned here.

[2] This is the art of fixing the aim by striking a fixed object at some distance.

[3] Just as the sciences of *Gândharvaveda*, and *Âyurveda* have their own arts, so also this science, *Dhanurveda* (which is an *Upaveda* of *Yajurveda*) has those five arts or five practical aspects.

172. The act of putting down the actions of water, air and fire is an art.

173. The preparation of boats, chariots and conveyances is an art.

174. The preparation of threads and ropes is an art.

175. The weaving of fabrics by various threads is an art.

176. The testing of gems as to whether they are good or bad as possessing marks or holes is an art.

177. The testing of gold and other metals is an art.

178. The preparation of artificial gold and gems is an art.

[1]179. The making of ornaments with gold and other metals is an art, as well as enamelling of metals.

180. The softening of leathers is an art.

[2]181. The flaying of skins from the bodies of the beasts is an art.

182. Milking and churning constitute two arts.

183. The knowledge of sewing of covers (coats and shirts) is an art.

184. Crossing waters by arms (swimming) is an art.

185. The cleansing of domestic utensils is an art.

186. Cleaning of clothes and shaving are two arts.

187. The extraction of oil from seeds and flesh (fats) is an art.

188. The drawing of ploughs and the climbing of trees are two arts.

189. The knowledge of work in such a way as to please somebody is an art.

[3]190. The making of vessels with bamboo straws, etc., is an art.

[4]191. The making of glass vessels is an art.

192. The pumping and withdrawing of water constitute an art.

193. The preparation of tools and implements from iron is an art.

194. The preparation of saddles for horses, elephants, bulls and camels is an art.

[5]195. The maintenance, and entertainment, and nursing ofchildren constitute an art.

196. The punishment of offenders, *e.g.*, whipping, is an art.

[6]197. The writing of the characters of various languages is an art.

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[1] Two arts are mentioned in this line. *Enamelling* was practised as an art, it appears.

[2] Leather Industry is mentioned in its two processes—(1) The flaying of the skin, (2) The softening of the hide (tanning).

[3] Cane-work it is called—basket-making, etc.

[4] Glass is mentioned here as also in other places in *Śukranīti*.

[5] Nursing was learnt and practised as an art it seems. At any rate the midwives must have been trained in this art.

[6] The knowledge and practice of the various alphabets of different peoples were respected as an independent branch of learning. And it is implied that there were men who equipped themselves specially with this art.

198. The making and preservation of the betels constitute an art.

199-200. Speed in taking, but delay in giving—these are the two features of all arts. (?)

201. The sixty-four arts have thus been enumerated in brief.

[1]202. One should do work with the help of the various Kalâs mentioned.

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[1] The enumeration of the 64 कलाs gives a picture of the industrial and economic condition of the age described in *Śukraniti*, as that of the विद्या gives a picture of the intellectual and literary condition. And the two pictures together constitute a graphic account of the actual social life the people of India lived in those times.

After going through this one can hardly believe that the Hindus were a race of abstract metaphysicians who were negligent of the actual needs of the society cultivated the art of preparing for the next life only. One would rather think that they knew how to enjoy life and supply its necessaries, comforts and decencies. Economically speaking, they were as self-sufficient as any people could possibly be, and made their material and secular life as comfortable and happy as possible. 'And intellectually speaking, they were competent enough to investigate not only the highest truths of the universe—the eternal problems of existence, but also to study and discuss all those branches of learning which had for their aim the practical furtherance of social ends—the amelioration of human life.

The more one studies the social, economic, political and other secular facts of the civilisation of the Hindus the more one is impressed with the fact that their institutions—industrial, educational and administrative were adequate for all the ends of human existence ; and if they differ from anything of the kind in modern times or in other countries it is because of the adaptation to the circumstances and conditions of time and place which is the fundamental cause of all varieties and divergences in the universe. And those who advocate the doctrine of *relativity of institutions* cannot think of the Hindus as an economically inefficient or politically incompetent race or as one who has no industrial or political aptitudes. The fact rather is, in all these aspects of secular civilisation, they represent a distinct type which is not necessarily low, mediaeval or primitive simply because it does not resemble the types that are predominant to-day.

THE SIXTY-FOUR KALÂS.

A.—Twenty-three arts derived from the *Vedas* through the 1 *Upavedas*.

I. *Gândharva*—(1) Dancing, (2) Playing on musical instruments, (3) Decorations, (4) Antics, (5) Laying out beds, etc., (6) Jugglery, magic, etc., (7) Sexual intercourse.

II. *Âyurveda* (1) Preparation of alcohol, (2) Surgical operations (3) Cooking. (4) Gardening, (5) Metallurgy, (6) Confectionery, (7) Pharmacy. (8) Analysis and Synthesis of metals, (9) Alloys, (10) Salts.

III. *Dhanurveda*—(1) Taking up of stands for the employment of arms, (2) Duelling. (3) Marking of aim, (4) Battle arrays, (5) Employment of horses, chariots, etc.

IV. *Tantra* (?)—Sitting in meditative postures.

B. Other कला—41.

(1) Driving horses and elephants, (2) Teaching horses and elephants, (3) Polishing earthen vessels, (4) Polishing wooden vessels, (5) Polishing stone vessels, (6) Polishing metal vessels, (7) Drawing, (8) Building, (9) Watches, Clocks, etc., (10) Dyeing, (11) Mechanical operations, putting down fire, etc., (12) Construction of boats and other conveyances, (13) Rope-making, thread spinning, (14) Weaving, (15) Testing of gems, (16) Testing of metals, (17) Preparation of artificial gems and metals, (18) Making of ornaments, (19) Enamelling, (20) Softening of leathers, (21) Flaying of hides, (22) Milking, (23) Churning, (24) Tailoring, (25) Swimming, (26) Cleansing of domestic utensils, (27) Washing, (28) Shaving, (29) Extraction and preparation of oils from fats and seeds, (30) Ploughing, (31) Climbing, (32) Flattering or Entertaining, (33) Cane-work, (34) Glass-work, (35) Pumping, (36) Work in Iron Foundries, (37) Preparation of saddles, (38) Nursing and management of babies, (39) Whipping criminals, (40) Writing in different alphabets, (41) Preparation of betels.

SECTION IV.

SOCIAL CUSTOMS AND INSTITUTIONS.

1-2. The *Brahmachârî*, the Householder, the *Vâṇaprastha* and the *Yatî*—these are the four compulsory stages of every Brâhmaṇa.

[1]3. Of the others who follow the activities of the Kṣatriya, Vaiśya, and Śûdra—all except the last.

4-5. The *Brahmachârî* is the disciple who wants learning, the Householder is for maintaining all men, the *Vâṇaprastha* or the man who has retired to forests is for restraining (the passions and activities), and the *Sanyâsî* attempts the attainment of Salvation.

6. The castes and stages which exist otherwise should be punished.

[2]7-8. If disregarded by the king and unrestrained by his punishments, the high families become bad, the low ones become elevated.

9-10. The female Śûdra should never practise the following things without husband: recital of hymns, penances, pilgrimages, foreign travel, observance of *mantras* and worship of gods.

11. Women have no separate right to the use of the means for the realisation of the three-fold end, *e.g.*, virtue, wealth, and desires.

12-13. She should get up before her husband and purify her body, then raise the beddings and cleanse the house by sweeping and washing,

[3]14-15. should then come to the yard, covered with grass, cleanse the vessels used in sacrifices by hot water,

16. then should keep them at the proper place.

17. She should make the vessels empty and fill them (again with fresh water),

18-19. should wash the vessels of the kitchen on the outside, cleanse the hearth with earth (and other things) and place fire there with fuel.

[4]20. She should study the vessels to be used and the various

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[1] The first three stages are compulsory of all others.

[2] The king should maintain the several classes in their proper *âśramas* and punish them if they go astray. The performance of one's own duties in life according to caste and stage should be rigidly enforced.

[3] यवस—Grass.

[4] In this routine of duties and daily work one notices the virtues of a civilisation based mainly on domestic life and the rights and merits of persons not as citizens but as members of a family. Before the woman goes to pay respects to the superiors she must finish all the drudge work. So she must rise very early. Here is a very graphic account of the ordinary social (and material) life of the Hindus.

articles of food. Having thus finished the work of the forenoon she should bow down to the father-in-law and mother-in-law.

21-22. She should put on clothes, ornaments and jewels given by the father-in-law, mother-in-law, husband, parents and brothers, uncles and relatives.

23-25. The wife should be pure in mind, speech and action, abide by the instructions of her husband, and follow her like a pure shadow, and be a friend in all his good activities, and servant in all his commands.

26-28. She should then cook the food, inform her husband, and then feed those who are to be fed by the food first given to the gods of the universe.

29-30. Then her husband, and lastly herself, partake of the meals at the instance of her husband. She should then spend the remainder of the day time in studying the proper earnings and expenses (*i.e.*, settle accounts).

31-32. Then again in the evening *as well as in the morning* she should cleanse the house, cook the food, and feed the husband and the servants.

33-34. She should take her food not immoderately, finish the sundry domestic duties, then spread a good bed and serve the husband.

35-36. She should lie down on that bed after the husband is asleep with her mind fixed on him, not naked, not excited, without passions and by restraining senses.

37-38. She should not talk aloud or harsh, not call frequently (?) and not speak unpleasant things. Should not quarrel with anybody, and should not talk nonsense.

39. She should not be extravagant, nor act at variance with virtues and interests.

40-42. The good wife should give up words that indicate senselessness, lunacy, anger, and envy, and the contemptible vices of meanness, jealousy, excessive attachment to things of this world, vanity and boastfulness, atheism, adventurousness, thieving and pride.

43-44. Thus behaving with the husband as with a great god she gets fame in this world and heaven (?) in the next.

45. The daily duties of women have been mentioned above. The occasional functions are being narrated now.

46-49. She should give up all these things when she sees *rajas* *i.e.*, when she is menstruated. She should live bashfully in an inward apartment unseen by anybody. She should have only one piece of cloth devoid of bath and ornaments, hence look thin and humble, and sleep on the ground without passions, and thus spend three days.

50-52. She should take her bath at the expiration of three nights with the clothes. She becomes pure after seeing her husband's face. After having thus purified herself she should work as before.

53. This is the duty of women of the twice-born castes and this is desired of others also.

54. The women should be assistants in the functions of the males, *viz.*, agriculture, shopkeeping, etc.

55-56. The woman should practise music, gentle manners, etc., according as the husband is master of these and perform the winning arts, etc., with regard to him.

57-59. When the husband is dead, the chaste woman should accompany him or observe the vow, should not like to go to other's houses, and should always maintain *brahmacharyya* or control of passions, should give up the daily ornamentation of self.

59-61. When the husband is gone abroad, the wife should be devoted to the adoration of the gods, wish well of the husband, put on things that indicate good, and only a few ornaments.

62-63. There is no lord like the husband, there is no happiness like the husband. The husband is the real protector of women—not all the wealth.

64-65. The father gives measured things, the brother and son also give only limited things. Who does not worship the husband who is the giver of infinite (blessings)?

[2] 66-68. The *Śûdra* is the fourth caste and hence as belonging to a caste has certain duties—except the *mantras* of the *Vedas*, *Swadhâ*, *Swahâ*, *Vaṣat*, etc., but only those actions which require *namas* as the sign of adoration, *viz.*, the *mantras* given in the Purâṇas.

[3] 69-70. People should practise their duties like Brâhmaṇas if born of women married with *Brâhmaṇas*, like *Kṣatriyas* if born of women

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[1] Up to 64, the duties and functions of the twice-born have been mentioned.

[2] In any religious service, the Śûdra cannot pronounce the *mantras* स्वधा, स्वाहा, वषट् given in the Vedas. He has right to pronounce only नमस्—the Mantra mentioned in the Purâṇas. Thus he has right only to the study of Purâṇas.

स्वधा, स्वाहा, वषट्—exclamations used on presenting an oblation to the manes.

[3] A Śûdra woman may be married to a Brâhmaṇa, Kṣatriya and Vaiśya and would give rise to Brâhmaṇa, Kṣatriya and Vaiśya offsprings, respectively. It is the character of the husband that establishes the character of the issue to a marriage.

married with Kṣatriyas and like Vaiśyas if born of women married with Vaiśyas.

71. But people born of Vaiśya women by Kṣatriyas and Brâhmaṇas should be treated as Śûdras, also men born of Śûdra women (?).

72. The man who is born of a lower male and higher female is known as the worst of Śûdras.

73. The *Śûdrâdhama* or the worst of Śûdras should always practise his duties according to *nâma mantra* (*i.e.*, by repeating the name of god only) in a manner inferior to that of the *Śûdra*.

74-75. The *Yavanas* have all the four castes mixed together. They recognise authority other than that of the Vedas and live in the north and west.

76. Their *Śâstras* have been framed for their welfare by their own masters.

[1]77. But the rules that are followed for ordinary purposes are the same in the two cases.

78-79. Inferiority and superiority depend sometimes on the qualities of the seed, sometimes on the character of the field. But excellence is due to both.

[2]80-81. Viśwâmitra, Vasiṣṭha, Mâtaṅga and Nârada and others became elevated by special penances not by birth.

82-83. Every caste should practise the duties that have been mentioned as belonging to it and that have been practised by ancestors, and should otherwise be punished by kings.

84. The king should differentiate the castes and stages by separate marks of distinction.

85-87. The king should always keep in his kingdom the tools and implements of the metal workers after inspecting them; and maintain artists and artisans according to need, and employ additional workers in agriculture or menial service.

88. The goldsmiths are the fathers of thieves.

[3]89-90. He should build the *Ganjâ* house (a tavern) outside the

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[1] The home and characteristics of the यवन s are described here. It is mentioned that however much they might differ from those who follow the system of castes and stages in matters of आचार्य्य, शास्त्र, and प्रमाण, *i.e.*, sages, moral codes and authority, they are at one with them in rules of ordinary business-morality, व्यवहारनीति and the standards of daily life

[2] This is an intance of the क्षेत्र or field being good, not the seed or birth.

[3] Liquor-houses and other houses for indulgence in intoxication should be kept at a distance from the village.

village and there keep the drunkards. And should never allow drinking of liquor in his kingdom in the daytime.

91-93. The king should have the domestic plants planted in villages and the wild trees in the forests—the good ones at a distance of twenty cubits from one another, the middling at a distance of fifteen cubits and the ordinary ones at a distance of ten cubits and the youngest at a distance of five cubits.

[1]94. He should nourish them by stools of goats, sheep and cows, water as well as meat.

95-102. The *udumvara* (Ficus glomerata); *aśwattha* (the holy fig tree), *vata* (banyan), *chincha* (tamarind), *chandan* (sandal), *gambhala* (lime), *kadamba* (Nauclea Cadamba), *aśoka* (Jonesia asoka), *vakula* (Mimusops Elengi), *vilwa* (bael), *amrita*, *kapitthaka* (wood apple), *râjadan* (Mimusops hexandra), *âmra* (mango), *punnâga* (Calophyllum înophyllum); tuda (Mulberry); *champaka* (Michelia champaka); *nîpa* (a species of Aśoka); *koka* (a wild date tree); *amra* (Spondias mangifera), *sarala* (pine), *dârima* (pomegranate), *akṣota* (walnut), *śiṃśapâ* (Dalbergia sissoo), *vadara* (jujube), *nimba* (Neem), *jambira* (lime), *kṣirika*, *kharjura* (date), *devakaraja* (Pongamia glabra), *phâlgu* (opposite leaved fig tree), *Tâpinchha* (tamâla), *bhala* (Semecarpus anacardiam), *kudvâla* (ebony), *lavali* (Phyllanthus distichas), *dhâtri* (woodfordia floribunda), *kramuka* (betelnut), *mâtulungaka* (citron), *lakucha* (Artocarpus lakoocha), *nârikela* (cocoanut), *rambhâ* (plantains)—these are the trees which bear good fruits.

103. He should plant those trees which bear good flowers very near the village.

104. One should lay out a fair garden to the left of the dwelling house.

[2]105-106. The trees are to be watered in the morning and evening in summer, every alternate day in winter, in the fifth part of the day (*i.e.*, afternoon) in spring, never in the rainy season.

107-108. If trees have their fruits destroyed, the pouring of cold water after being cooked together with *Kulutha*, Mâśa (seeds), *Mudga* (pulse), *Yava* (barley) and *Tila* (oil seed) would lead to the growth of flowers and fruits.

109. Growth of trees can be helped by the application of water with which fishes are washed and cleansed.

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[1] Ordures and dungs have always been recognised as good manures.

[2] In these lines we get some of the agri-flori-horti-cultural ideas prevalent in those times.

110-112. The powder of the dungs of goats and sheep, the powder of *Yava* (barley), *Tila* (seeds), beef as well as water should be kept together (undisturbed) for seven nights. The application of this water leads very much to the growth in flowers and fruits of all trees.

113-114. Those trees which bear thorns, *e.g.*, the Khadira (catechu), etc., are known as wild and should be planted in forests.

115-122. *Khadira* (catechu), *aṣmanta* (oxalis), *sâka* (Teak), *agnimatha*, (Premna spinosa), *syaunâka* (Bignonia Indica), *vabbula* (Acacia), *tamâla*, (Cinnamomum tamâla), *sâla* (Shorea robusta), *kûtaja* (Holarrhena antidysenterica), *dhava* (Anogeissus latifolia), *arjuna* (Terminalia arjuna), *palâśa* (Butea frondosa), *śaptaparṇa* (Alstonia scholaris), *śamî* (Acacia spigera), *tunna* (Cedrala toona), *devadâru* (Pinus longifolia), *vikeṅkaṭa* (Flacourtia sapida), *karamaṇḍa* (Carissa Carandas), *iṅgudî* (Balanites Roxburghii), *bhûrja* (Betula bhojapatra), *viṣamuṣṭhi*, strychnos nuxvomica), *kariraka* (Capparis aphylla), *sallaki* (Boswellia serrata), *kâśmari* (Gmelina arborea), *pâṭha* (Stephania hernandifolia), *tinduka* (Diospyros Embryopteris), *rîjasâraka* (name of a tree not identified), *harîtakî* (Terminalia Chebula), *bhallâta* (Semecarpus anacardium), *sampâka* (name of a tree not identified), *arka* (Calotropis gigantea), *puṣkara* (a tree not identified), *arimeda* (Acacia Farnesiana), *pitadru* (a kind of pine tree), *śâlmalî* (Bombax malabaricum), *vibhîtaka* (Terminalia bellerica), *naravela* (a plant not identified), *madhuka* (Bassia latifolia) and other large trees.

123-124. Expansive trees, shrubs, and creepers are to be carefully planted in villages if domestic, in forests if wild.

125-129. Wells, canals, tanks and ponds should be made accessible, (by staircases, &c.) should have width twice or thrice the depth and footpaths round them. There should be many of these so that there may be plenty of water in the kingdom. Bridges should be constructed over rivers. There should also be boats and water conveyances for crossing the rivers.

130-131. The temples of the gods who are worshipped by a caste and houses of the preceptors who are the teachers of its arts and sciences should be situated in the front of the houses belonging to it.

132-133. The king should build temples for Viṣṇu, Śaṅkara, Gaṇeśa, Sun and Pârvatî in the squares, or the centre of the village.

134-137. (The temples are) to be of the *Meru* or some other of the sixteen types ; to be beautiful, round, square or of some other mechanical form ; to have *maṇḍapas* or halls, walls, *gopuras* or central gates ; to have height twice or thrice the width, to have good images inside made according to the prescribed rules, to have water at the foot and to be well painted or decorated.

138-139. [1]A *Meru* temple is that which has one thousand domes, has one hundred and twenty-five stories, is one thousand cubits wide and one thousand cubits high.

140-141. The *Mandara* and other types of temples mentioned below are one-eighth less than the preceding:—the *Mandara*, *Ṛikṣamâlî*, *Dyumaṇi*, *Chandraśekhar*, *Mâlyavân*, *Pârijâtra*, *Ratnaśîrṣa*, *Dhâtumân*, *Padmakoṣa*, *Puṣpahâsa*, *Śîkara*, *Swastika*, *Mahâpadma*, *Padmakûta*, and *Vijaya*, the sixteenth.

145-146. The *maṇḍapa* or hall of each temple is to be adapted to each and one-fourth less than the temple in height. The images should be placed or set up there with the hymns appropriate to the gods that have been embodied.

[2]147-151. The characteristic of an image is its power of helping

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[1] The मेरु temple described as having :—

(i) 1,000 domes. (ii) 125 stories.
(iii) 1,000 cubits height. (iv) 1,000 cubits width.

The मन्दिर is the temple having :-

(i) 875 domes. (ii) 110 stories.
(iii) 875 cubits height. (iv) 875 cubits width.

Thus one gets the following table : -

	Type.	Domes.	Stories.	Height in cubits.	Width in cubits.
1.	मेरु ...	1,000	125	1,000	1,000
2.	मन्दर ...	875	110	875	875
3.	ऋक्षमाली	766	96	766	766
4.	द्युमणि	670	84	670	670
5.	चन्द्रशेखर	586	74	586	586
6.	माल्यवान्	513	65	513	513
7.	परियात्र	449	57	449	449
8.	रत्नशीर्ष	393	50	393	393
9.	धातुमान्	344	44	344	344
10.	पद्मकोश	301	36	301	301
11.	पुष्पहास	263	32	263	263
12.	शीकर	230	28	230	230
13.	स्वस्तिक	201	25	201	201
14.	महापद्म	176	22	176	176
15.	पद्मकूट	154	19	154	154
16.	विजय	135	17	135	135

[2] Worship of images is here mentioned as only a means to an end. The image is the concrete embodiment of the divinity and helps the mind to fix itself on it by meditation.

forward contemplation and *yoga*. The human maker of images should therefore be meditative. Besides meditation there is no other way of knowing the character of an image—even direct observation (is of no use). Images are made of sands, pastes, paints, enamels, earth, woods, stones and metals and are strong in succession.

[1] 152-153. The image constructed full according to the prescribed limbs is beautiful and yields virtue, otherwise takes away wealth and life and daily increases grief.

[2] 154-157. The images of gods yield happiness to men, and lead to heaven; but those of men lead away from heaven and yield grief. That image is beautiful which is neither above nor below the fixed proportion. But the images of gods, even if deformed, are for the good of men.

[3] 158. But the images of men, even if well formed, are never for human good.

159. Images are of three kinds—*sâttwika*, *râjasika*, and *tâmasika*.

[4] 160. The images of Viṣṇu and other gods are to be worshipped in the *sâttwika*, *râjasika* or *tâmasika* form according to needs and circumstances.

[5] 161-162. The *sâttwika* image is that which has *yogamudrâ* or the posture of meditation, the straight back, hands giving blessings and courage and has the gods represented as worshipping it.

163-164. The *râjasika* image is that which sits on some *vâhana* or conveyance, is adorned with numerous ornaments, and has hands equipped with arms and weapons as well as offering courage and blessings (to the devotees).

165-166. The *tâmasika* image is that which is a killer of demons by arms and weapons, which has a ferocious and vehement look and is eager for warfare.

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[1] The image must be rightly made according to the proportions of its limbs. The sanction that compels artists to be very careful is, as usual, of a religious nature. The artist must not bungle with the work entrusted to him.

[2] Here are some very serious injunctions against the construction of human images. Human beings must not be painted or sculptured.

[3] Images of gods, even deformed, are allowable but not those of human beings even though well proportioned.

[4] *Each of the gods may be worshipped in the three forms. Each form is to be selected according to the purposes of the worshipper. The forms are being described below.*

[5] Characteristics of सात्विक image :—

(1) योगमुद्रा—The eye fixed upon the tip of the nose as in meditation.

(2) स्वस्थ—Straight posture, unbending.

(3) वराभयकर—Hands displayed as giving blessings and courage to the worshippers.

(4) देवेन्द्र—The gods must be worshipping the image.

167-168. The hymns of Viṣṇu and other gods are being described in brief, measurements of the images and their limbs in detail.

169. An *aṅgula* is one-fourth of a *muṣṭi* (the closed fist of a hand).

170. The length of a *tâla* is twelve *aṅgulas.*

171-172. The image of dwarf is to be seven *tâlas* in height, that of men eight *tâlas*, that of gods nine *tâlas*, that of *Râkṣasas* ten *tâlas.*

173-174. The height of images varies from seven *tâlas* (mentioned above) according to the customs of localities. But images of females and dwarfs are always seven *tâlas.*

175-176. Nara, Nârâyaṇa, Râma, Nṛisiṃha, *Vâṇa*, Vali, Indra, Bhârgava (Paraśurâma) and Arjuna are of ten *tâlas.*

177-178. Chaṇḍî, Bhairava, Vetâla, Narasiṃha, Varâha, Hayaśîrṣa and others who are of a vehement type are to be twelve *tâlas.*

179. The images of Piśâchas and Asuras are to be always sixteen *tâlas* in height.

180-182. Hiraṇyakaśipu, Vṛitra, Hiraṇyâkṣa, Râvaṇa, Kumbhakarṇa, Namuchi, Niśumbha, Śumbha, Mahiṣâsura, Raktavîja—these are to be sixteen *tâlas* in height.

[1]183. The *vâlas* are to be five *tâlas*, and the *kumâras* six *tâlas.*

[2]184-185. Images are of ten *tâlas* in *Satyayuga*, of nine *tâlas* in *Tretâ*, eight *tâlas* in *Dwâpara*, and seven *tâlas* in *Kali.*

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[1] वाल—Boy under five years of age. कुमार—an infant. The terms are however used as synonyms.

[2] अङ्गुल, = ¼ मुष्टि

12 अङ्गुल, = 1 ताल

The following are the measurements in *tâlas* described in the above lines :—

A. Ordinary.

(1)	वामन	7 Tâlas
(2)	मानुष	8 ,,
(3)	देव	9 ,,
(4)	राक्षस	10 ,,
(5)	स्त्री	7 ,,
(6)	कुमार	6 ,,
(7)	वाल	5 ,,

B. Special.

(1)	नर नारायण	10 ,,
(2)	चण्डी	12 ,,
(3)	भैरव हिरण्यकशिपु, वृत्र	16 ,,

C. According to the ages.

(1)	सत्य	10 ,,
(2)	त्रेता	9 ,,
(3)	द्वापर	8 ,,
(4)	कलि	7 ,,

186-187. *If the image be nine tâlas, the mouth must be one tâla,* the forehead four *aṅgulas*, the nose likewise.

188-189. The space from the tip of the nose to the end of the *hanu* (jaw) is to be four *aṅgulas*. The throat is to be four *aṅgulas*. The space from throat to heart is to be one *tâla*.

190-191. Thence downward to the navel the space is beautiful if one *tâla*. From the navel downwards to the genital organ there should be one *tâla*.

192-193. The two thighs are to be two *tâlas* each, the knees to be four *aṅgulas* each. The two legs are to be made equal to the thighs. The bottom of the ankle is to be four *aṅgulas*.

[1]194. The vertical measurements of an image of nine *tâlas* are thus given by the sages.

195 The image of seven, eight or ten *tâlas* should be divided according to the above proportion.

[2]197. The two hands are to be four *tâlas* each up to the ends of the fingers.

198. From the neck to the elbow the space is good if twenty *aṅgulas*.

[3]199. From the armpit to the elbow the distance is thirteen *aṅgulas*.

200 The *kara* or arm up to the end of the middle finger is twenty-eight *aṅgulas*.

201. The palm is seven *aṅgulas* : the middle finger is five *aṅgulas*.

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[1] The measurements of the image of 9 *tâlas* described above are given below :—

मुख		1 *Tâla*
ललाट	4 *Angulas.*	
नासा	4 ,,	
नासा हनु	4 ,,	
ग्रीवा		4 *Aṅgulas.*
ग्रीवा to हृदय		1 *tâla.*
हृदय to नाभि		1 ,,
नाभि to मेढ्र		1 ,,
ऊरु		2 *tâlas.*
जानु		4 *aṅgulas.*
जङ्घा		2 *tâlas.*
गुल्फ		4 *aṅgulas.*
	Total	108 *aṅgulas* or 9 *tâlas.*

[2] Of course this is to be the measure of the hands in the case of the nine-*tâlas*-type.

[3] कूर्पर—Elbow, कक्ष—armpit. So the distance from the armpit to the neck is seven *aṅgulas.*

202-203. The thumb is to be three *aṅgulas* and a half, should come up to the first joint of the forefinger and should have two joints. The other fingers are each to have three joints.

204. The *anâmâ* or ring-finger and the *tarjjaṇî* or forefinger are to be less by half an *aṅgula* or a full *aṅgula* (than the middle).

205. The little finger is less than the ring-finger by one *aṅgula.*

206-207. The feet are to be fourteen *aṅgulas* each, the thumb is two *aṅgulas* or two *aṅgulas* and a half. The *pradeśini* or that finger of the foot by which something is pointed out is of that size.

208. The *pradeśini* may be two *aṅgulas*, the others are one *aṅgula* and a half each.

[1]209. The hands and legs must have veins suppressed and the ankles must be hidden.

[2]210-212. Those limbs are beautiful which are neither more nor less in measurement than the limbs of images prepared by the experts. And those which are to please all must not be either too thin or thick.

213. It is one in a lakh that is produced beautiful in all limbs.

214. That which is beautiful according to the measurements laid down in the Śâstras is really beautiful, not any other.

215. That which is not according to the measurements laid down in the Śâstras is not beautiful, say the wise.

[3]216. That which satisfies the heart of certain individuals is beautiful to those individuals only.

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[1] The hands and legs must not be disfigured by prominent veins and arteries. The ankles also must not be protuberant or prominent.

[2] Measurements of other limbs of the image of nine *tâlas* :—

(1) बाहु	4	*tâlas.*
स्कन्ध to कूर्पर	20	*aṅgulas.*
बाध to कूर्पर	13	„
कर	28	„
(2) करतल	7	*aṅgulas.*
(3) मध्यम	5	„
(4) तर्ज्जनि	4	„
(5) अङ्गुष्ठ	3½	„
(6) अनामा	4½	„
(7) कनिष्ठ	3½	„
(8) पाद	14	„
(9) अङ्गुष्ठ	2 or 2⅓	„
(10) प्रदेशिनी	2 or 2½	„
(11) Other fingers of the foot	2 or 2½	„

[3] Individuals may be satisfied with certain images according to their idiosyncrasies and peculiar tastes and predilections.

Having described the proportions of the erect posture ऊर्द्ध्वमान Śukrâchârya is going to describe the horizontal measurement of each limb.

217. The forehead is to be eight *aṅgulas*, the two eyebrows are to be likewise.

218. The eyebrows are to be half *aṅgula* in width and must be bow-like in the middle.

[1]219. The two eyes are to be three *aṅgulas* in length and two *aṅgulas* in width.

220. The pupil is to be one-third of the eye and black in colour.

221. The space between the two eyebrows is two *aṅgulas*. The origin of the nose is one *aṅgula*.

222. The tip of the nose is to be one *aṅgula*. And the two nostrils together to be two *aṅgulas*.

[2]223. The nose may be of two kinds—having the shape of the bird's mouth (aquiline or curved) or like the flower (straight).

224. The two nostrils are to be beautiful like the *niṣpâpa* legume.

225. The ears are equal to the eyebrows and four *aṅgulas* long.

226. The fleshy portion of the ears is to be three *aṅgulas* and a half thick.

227. The nose-bone is to be half an *aṅgula* (wide and broad), smooth, and high by one and a half *aṅgula*.

228. From the end of the neck to the end of the throat the space is eight *aṅgulas*.

229. The space between the two hands is to be two *tâlas*. The space between the two nipples is to be one *tâla*.

230. The space between the two ears is to be sixteen *aṅgulas*.

231. The space between the ear and the jaw is always eight *aṅgulas*.

232. The space between the nose and the ear is likewise. The space between the ear and the eye is half that, *i.e.*, four *aṅgulas*.

233. The mouth is one-third of a *tâla*, the lips are to be half an *aṅgula* each.

234-235. The circumference of the head is thirty-two *aṅgulas*. Its width is ten *aṅgulas*, length twelve *aṅgulas*.

236. The circumference of the throat is twenty-two *aṅgulas*.

237. The circumference of the breast is fifty-four *aṅgulas*.

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[1] **आयाम—Length.**

[2] **पुष्पवत्—Having the shape of the तिलपुष्प which is very straight.**

238. The circumference of the heart is one *aṅgula* less than four *tâlas* (*i.e.*, forty-seven *aṅgulas*).

239. The space between the nipple and the back (or the thickness of the breast) is twelve *aṅgulas*.

240. The circumference of the waist is two *aṅgulas* in addition to three *tâlas* and a half (*i.e.*, forty-four *aṅgulas*).

241. The height of the hip is to be four *aṅgulas* and the width six *aṅgulas*.

242. At the back the posterior of females is one *aṅgula* greater.

243. The circumference of the forepart of the hand is sixteen *aṅgulas*, that of the origin of the hand is eighteen *aṅgulas*.

[1]244. The circumference of the origin of the arm is fourteen *aṅgulas*, that of the forepart of the arm is ten *aṅgulas*.

245. The width of the palms of the hands and feet is five *aṅgulas*.

246-247. The circumference of the origin of the thigh is thirty-two *aṅgulas*, that of the end or forepart of the thigh is nineteen *aṅgulas*.

248. The circumference of the origin of the legs is sixteen *aṅgulas*, that of the end of the legs is twelve *aṅgulas*.

249-251. The circumference of the root of the middle finger is four *aṅgulas*, that of the roots of the forefinger and ring-finger is three *aṅgulas* and a half each. That of the little finger at the root is three *aṅgulas*.

252. The circumference of the end or forepart (of each finger) is a quarter less than that of the root.

253. The circumference of the thumb of hand is four *aṅgulas*, that of the thumb of the leg is five *aṅgulas*.

254. The circumference of the other fingers of the feet is three *aṅgulas*.

255. The circular ring of the breast is an *aṅgula* and a half, that of the navel one *aṅgula*.

256. One should design for all the limbs a grace that is suited to each.

257-258. One should not construct any image that has eyes directed upwards, downwards or closed, nor should design one that has vehement eyes, but eyes bespeaking satisfaction.

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[1] So the whole hand is to be conical—the origin 18 *aṅgulas* in width and the end 10 *aṅgulas*.

[1]259. The seat or stand on which the image is to be placed is to be one-third or one-half of itself.

260. The doors of the room are to be twice, thrice or four times the image.

261. The floor of the temple is to be one, two, three or four cubits high.

262. The height of the wall from the floor is to be ten cubits greater than the height of the floor.

263. The height of the palace is to be double that of the doors.

264. The dome is to be equal to, twice or thrice, the height of the whole building.

265-266. The building should be constructed with stories up to one hundred and twenty-fifth and with eight corners like a lotus.

267. The building must be a *chatussâla* and have halls all round it.

268. That with one thousand pillars is good, others are middling or inferior.

269-270. If there is to be a dome over the palace or the hall pillars need not be constructed, the walls are sufficient.

271-272. The space inside the palace (temple) around the image or in front of it is to be six or eight times that (image).

273. The vehicle is to be equal to, one and a half time or twice the image.

274. Where the forms of gods are not mentioned they are to have four hands.

[2]275-278. Where there is no mention of weapons, the lower hands are to indicate courage and blessings, and the upper hands should have

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[1] All these regulations have been framed according to the standard of æsthetic perfection prevalent in those times. Even a superficial study of these canons of Hindu art is sufficient to convince people of their love of exactness, accuracy and mathematical rigidity in the management of secular affairs. Connoisseurs of art would do well to take note of these rules laid down by Śukrâchârya.

[2] शङ्ख, चक्र—For Viṣṇu.
पाश—For Varuṇa.
माला—For Sun.
डमरुशूल—For Śiva.
मातुलुङ्ग—For Lakṣmî.
वीणा, पुस्तक —For Saraswatî.
लड्डुक—For Gaṇeśa.

śankha (conch), *chakra* (wheel), *ankuśa* hook), *pâśa* (noose). *damaru* (horn), *śûla* (trident), *kamala* (lotus), *kalasa* (pitcher), *sru* (vessel used in sacrifice), *lâdduka* (sweet balls), *matulungaka* (fruit), *vînâ* (lyre), *mâlâ* (garland), or book.

279. Where there is a multiplicity of mouths or heads these should be set up in a row.

280. Each should have its own throat, crown, eyes and ears.

[1]281-3. Where there is a multiplicity of hands, the necks need not be separated. The portion above elbows should be slender ; flat nose should be [represented] massive. Shoulders should be in deportment as trunks.

284. The mouths of Brahmâ are to be placed in four directions (*i.e.*, not in a row).

285-286. Hayagrîva, Varâha, Nṛisiṃha, Gaṇeśa are to be like men except in mouths, and Nṛisiṃha except in nails.

287-288. The images of the worshipped gods are to be made according to the above marks whether sitting on the vehicles or on their seats.

289-291. The images should always be without beards and eyelids and of sixteen years of age, have beautiful ornaments and clothes and be painted with brightest colours, covered up to the feet by clothes and adorned with ornaments.

[2]292-293. The images are not to be constructed with limbs less or greater than the fixed proportion. That with less limbs injures the householder, and that with more, the artist.

[3]294-295. The too thin image causes perpetual famines and the too thick one causes constant diseases. That with hidden joints, bones and veins ever increases happiness.

296. The *sâttvika* form of Viṣṇu's image is to have hands with blessings, courage, conch and lotus.

297. The *sâttvika* form of Soma's image is to have hands with deer, musical instrument, courage and blessings.

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[1] All the hands must issue from the same neck.

[2] The *sanction* for the observance of the canons of art cannot be stricter than what is given here.

[3] The last two lines provide the religious or spiritual *sanction* to the rules of art. Here we get the social and economic.

298. The sâttvika form of the image of the god whose mouth is like that of the elephant is to have hands with blessings, courage, lotus and lâdduka (sweet balls).

299. The *sâttvika* form of the Sun's image is to have hands with lotus, garland, courage and blessings.

300. The *sâttvika* form of *Śrî* (Laksmi)'s image is to have hands with *Vîṇâ, Luṅga* (fruit), courage and blessings.

[1]301-302. The images of Viṣṇu and other gods may have six separate forms through conch, wheel, mace, *padma* and other weapons.

303-304. The differences can be distinguished by noticing the *upâdhis* (names) as well as the union and separation of limbs.

[2]305-306. If there be an absence of one or two marks in the images made by painting, drawing, or of sands, earth and pastes, there is no offence.

[3]307-308. So also defects of measurement are not to be noticed in the following images—those made of natural Vâṇaliṅgas (stones of the Nerbudda Valley) or Chandrakântas or of gems found in the Gaṇḍaka river.

[4]309. One should consider the defects of proportion in the images of stones and metals only.

310-311. The artist should construct images with white, yellow, red, and black stones according to the ages and with others according to one's option.

[5]312-313. The white colour is of *sâttvika* type, the yellow and red of the *râjasika, tâmasika* type is of black colour--if the other marks described above are attendant.

314. Images are to be of gold, silver, copper and bronze in the *Satya, Tretâ, Dwâpara* and *Kali yugas* respectively.

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[1] Every *sâttvika* form may have two types—one described in lines 226-300, and the other with weapons in each hand in the place of courage and blessings. The *râjasika* and *tâmasika* forms also have two types each. So each image may have six possible forms.

[2] The temporary images need not be executed with particular care, it seems.

[3] Like the temporary images, these natural stone images also are to be leniently examined

The rivers Nerbudda and Gaṇḍaka are mentioned as being sources of stones and gems used in the sculptor's art.

[4] Those which are to be durable and which require human skill for the execution require to be tested very minutely and must satisfy the conditions of good art as elaborated above.

[5] Having described the *stones* to be used according to the *Yugas*, Śukrâchâryya now fixes the *metals* for each.

315-316. Śaṅkara's image is to be of white colour, Viṣṇu's to be black, that of the Sun, Śakti (Pârvatî or Śaṅkara's wife) and Gaṇeśa to be copper-coloured (red).

317. The images may be of iron or lead according to one's purposes—say the sages.

318-319. For purposes of worship, whether temporary or permanent, the images should be constructed according to the marks fixed for palaces, &c., not others (without the proper marks) which are the destroyers of happiness.

[1]320. The marks of images are known from the relations between the adorer and the adored.

[2]321-323. Through the strength of the virtues of the worshipper who has his heart always fixed on God the defects of images go for nothing in a moment. The particular vehicle of a deity should be placed in front of the canopy before him.

324-326. Garuḍa has two hands, beautiful eyes, bills and wings, human form, the mouth like bills, a crown, and a bracelet with a charm, has his palms closed (in devotion), head bent low, and eyes fixed towards the lotus feet of the adored.

327. The birds that have become vehicles of gods can assume any forms they like So also the lion, the bull and other animals.

328. The *vâhana* or vehicle should be placed in the hall before the image.

329-330. These are always to be made according to their names and forms, well adorned and in meditative posture in the hall before the god.

331-334. The tiger has the form of a cat, yellow colour, black marks (stripes), huge physique and no manes. The lion has a thin waist, large eyebrows, big eyes, a young appearance, manes, grey colour and black marks.

335. The difference between the lion and the tiger is only in manes and marks, not in appearance.

336-339. Gaṇeśa is to have an elephant's face, man's form, long ears, big belly, thick but very short neck, thick legs, thick hands, long trunk,

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[1] **The character of the image may be known from the attitude of the worshipper and the purposes of his worship.**

[2] **Even if the image be ill executed the worshipper by his virtues and devotion can make up for the deficiencies.**

left tooth (tusk) suppressed, his own vehicle, and the trunk bent towards the left like a slightly curved rod.

340. The image is to be made with joints, bones and veins hidden and according to the proper measurements.

341-342. The trunk is to be four *tâlas* and a half. The head is to be ten *aṅgulas*, the eyebrows four *aṅgulas*.

343. The nose is the upper lip. The end of the trunk is to have a *puṣkara*.

344. The length of the ear is ten *aṅgulas* and the width eight *aṅgulas*.

345. The space between the two ears is two *aṅgulas* in addition to one *tâla*.

346. The circumference of the head is thirty-six *aṅgulas*.

347. The circumference of the head round the eyes is also thirty-six *aṅgulas*.

348. The circumference round the bottom of the eyes at the origin of the trunks is two *aṅgulas* in addition to two *tâlas* (twenty-six *aṅgulas*).

349. The circumference of the end of the trunk and of the *puṣkara* is ten *aṅgulas*.

350. The length of the throat is three *aṅgulas*, its circumference is thirty *aṅgulas*.

351. The circumference of the belly is four *tâlas*.

352. The length of the belly should be made six or eight *aṅgulas* by the artists.

353. The tusk is six *aṅgulas* in length, the circumference of its origin is also that.

354. The lower lip is six *aṅgulas*. The *puṣkara* is to have a lotus.

355-356. The circumference of the origin of the thigh is thirty-six *aṅgulas*. That of the end of the thigh is twenty-three *aṅgulas*.

357. The circumference of the origin of the legs is twenty *aṅgulas*.

358. The circumference of the origin of the hand is greater than that of the end by one or two *aṅgulas*.

359. The space between the eye and the ear is four *aṅgulas*.

360-361. The space between the ends of the eyes, centres of the eyes and the origins of the eyes is ten, seven and six *aṅgulas*, respectively. This is the opinion of experts with regard to Gaṇeśa's image.

362. The height and thickness of the breasts of women is five *aṅgulas*.

363. The circumference of the waist of women is two *aṅgulas* in addition to three *tâlas*.

364. The limbs of the female have all to be made up in seven *tâlas*.

365. In the image of seven *tâlas* the face is to be twelve *aṅgulas*.

366. The height of *vâlas* (or infants) varies.

367. The neck of the *śiśu* (very young child) is short and the head thick.

[1]368. The head does not grow in the same proportion as the limbs below the neck.

369. The whole body below the neck is to be four times and a half of the face.

370-371. The body from below the neck to the *śiśna* (genital organ) is to be twice the face. From the *sakthi* (or thighs) to the end the space is two times the face. The hands are two times and a half of the face.

372. There is no rule about the thickness but it should be made according as it looks beautiful.

373. The child begins to grow daily and very fast after the fifth year.

[2]374. The female has all the parts of her body fully developed in her sixteenth year, the male in the twentieth.

375. Then each deserves the full measurements of the seven-*tâla*-type.

376. Somebody acquires beauty even in childhood, others in young or old age.

377. The length of the throat below the face is three *aṅgulas*. The heart is nine *aṅgulas*.

378. The belly and abdomen (*vasti*) each is eighteen *aṅgulas*.

379. The knees are to be three *aṅgulas* each, the legs eighteen *aṅgulas* each.

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[1] **The limbs below the neck develop in size with years, not the head. Hence the head must be thick from the beginning.**

[2] **Here are the ideas about growth, development, puberty, &c., of human beings that prevailed in Śukra's times.**

[1]380. *The space from the ankle to the end is to be three aṅgulas in the image of seven tâlas.*

381. The throat is to be of *aṅgulas* of the number of Vedas (four), the breast ten *aṅgulas.*

382. The belly is to be ten *aṅgulas,* the abdomen ten *aṅgulas.*

383. The thigh is to be twenty-one *aṅgulas,* the knees four *aṅgulas.*

384. The legs to be twenty-one *aṅgulas.* From the ankle to the end the space is four *aṅgulas.*

[2]385. This is the proportion of limbs in an image of eight *tâlas.*

386-387. The face as well as the breast are thirteen *aṅgulas* each. The belly as well as the abdomen are ten *aṅgulas* each.

388. The end from the ankle as well as the throat are five *aṅgulas* each.

389. The thighs as well as the legs are twenty-six *aṅgulas* each.

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[1] The measurements of the seven-*tâla*-type :—

(1)	मुख	 12	*Aṅgulas.*
(2)	ग्रीवा	 3	„
(3)	हृदय	 9	„
(4)	उदर	 9	„
(5)	वस्ति	 9	„
(6)	सक्थि	 18	„
(7)	जानु	 3	„
(8)	जङ्घा	 18	„
(9)	गुल्फाधः	 3	„
	Total	84	„

[2] The measurements of the eight-*tâla*-type :—

(1)	मुख	 12	*Aṅgulas.*
(2)	ग्रीवा	 4	„
(3)	हृदय	 10	„
(4)	उदर	 10	„
(5)	वस्ति	 10	„
(6)	सक्थि	 21	„
(7)	जानु	 4	„
(8)	जङ्घा	 21	„
(9)	गुल्फ	 4	„
	Total	96	„

[1]390. In an image of ten *tâlas* there should be a *maṇi* at the head, measuring one *aṅgula*.

391. In an image of ten *tâlas* the hands are to be fifteen *aṅgulas*.

[2]392. In the images of less height (*i.e.*, eight or seven *tâlas*) they are to be less by two *aṅgulas* in each case.

393. Grace should be given to each image according to fitness.

395. In the image of ten *tâlas* the feet are to be fifteen *aṅgulas*.

[3]396-397. In the images of greater height the skilled artist should give one *aṅgula* more to the face and other limbs per total increase of one *tâla*.

398-99. The images of Asuras, Piśâchas and Râkṣasas are to have long thighs and legs, to be ferocious, cruel and vehement or sometimes very lean and thin.

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[1] Measurements of the ten-*tâla*-type

(1) मुख	... ...	13 *Aṅgulas.*
(2) ग्रीवा	... ...	5 „
(3) हृदय	... ...	13 „
(4) उदर	... .	13 „
(5) वस्ति		
(6) सक्थि	... ...	13 „
(7) जानु	... ...	26 „
(8) जङ्घा	... ...	5 „
(9) गुल्फ	... ...	26 „
(10) मणि	... ...	5 „
	...	1 „
	Total	120 ..

[2] Thus in the image of nine *tâlas*, hands 13 *aṅgulas.*
„ „ „ „ 8 „ 11 „
„ „ „ „ 7 „ 9 „

This is expressed by the follow

	Eleven-*tâla*-type	Twelve-*tâla*-type.	Thirteen-*tâla*-type.
(1) मुख ...	14	15	16
(2) ग्रीवा ...	6	7	8
(3) हृदय ...	14	15	16
&c.	&c.	&c.	&c.

But the total heights in these cases do not amount to 11 *tâlas*, 12 *tâlas*, &c.

The lines, therefore, do not give the measurements of the whole image of 11, 12, or 13 *tâlas*, but only that of the पाद् or foot. That is, the foot is to be lengthened by one *aṅgula* if the image be lengthened by 1 *tâla*.

[1]400. In the images of less height the feet are to be less by one *aṅgula.*

[2]401-2. In all measurements the middle finger is not to be less than five *aṅgulas* or greater than six.

403-4. The artist should always design the appearance of the young, very rarely that of the infant, but never that of the old.

405-6. The king should always set up such gods in the kingdom, and should every year perform festivals in their honour.

407. He should never keep in the temple images broken or made according to false measurements.

[3]408. He should also repair carefully the gods and temples.

[4]409-10. He should always worship the gods and see the entertainments in their honour but never apply his mind to self-enjoyment.

[5]411-12. The king should also celebrate the festivals that are observed by the people, and should enjoy happiness when they are happy and be aggrieved when they are in grief.

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[1] The line 400 is to be taken with l. 395. They give the measurements of the feet of images of ten *tâlas* and less then ten *tâlas.*

L. 396 also gives the measurements of the foot पाद in the case of images of greater height, though the construction seems to point to not only the measurements of the foot but also other limbs of images of greater height.

The idea is that if the image be shortened by one *tâla*, the foot will be shortened by one *aṅgula*; and if the image be lengthened by one *tâla*, the foot will be lengthened by one *aṅgula.*

[2] For the images of seven, eight, nine, or any number of *tâlas* the length of the middle finger is fixed between five and six *aṅgulas.*

[3] The king should always be on the watch for the repair of old temples, palaces and images.

[4] Amusements and entertainments on the occasions of the festivals are consecrated to the gods—should not be regarded as means of self-enjoyment.

Here is the very *spirit* of Hindu Sociology which makes every thing human an offering to the gods and the whole life a perpetual consecration to their service.

[5] The festivals are not all to be of a religious nature. The king should sympathise and take part in the folksongs and popular festivals also.

SECTION V.

THE KING'S FUNCTIONS.

[1]1. The king should punish the wicked by administering justice.

2. The subjects who are made to observe his orders are always under his authority.

3. The wicked man is the destroyer of good, an enemy of the State and the propagator of vices.

4. The furtherance of the good of the people and their protection are necessary.

5. The destruction of enemies means the prevention of them from committing injuries.

6. The punishment of the wicked means the prevention of wicked actions by them.

7-8. *Vyavahâra* or judicial proceeding is that which, by discriminating the good from the evil, ministers to the virtues of both the people and the king and furthers their interests.

9-11. The king should attentively look after lawsuits (*vyavahâras*) by freeing himself from anger and greed according to the dictates of Dharma Śâstras,—in the company of the Chief Justice, *Amâtya*, Brâhmaṇa and Priest.

12-13. He should never singly try the cases of two parties or hear their statements. Neither the wise king nor the councillors are ever to try in secret.

14-15. The causes of partiality and imputation are five in number:—passion, cupidity, fear, malice and secret information from the parties.

16-17. The king who does not perform his civic duties well has undoubtedly to rot in the hell.

18-19 The enemies soon overpower the king who through delusion and passion decides cases against the dictates of Śâstras.

[2]20-21. *The actions of kings without help (of councillors) lead to* hell and destruction, take away the fear of the enemy's army and ruin life and wealth.

22. So the king should decide cases according to the Śâstras.

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[1] **The Section deals principally with laws and administration of justice.**

[2] **अनिक Army. बीज Grains, wealth.**

23-26. Where the king cannot personally attend to administration of justice he should appoint Brâhmaṇas who are versed in Vedas, self-controlled, high-born, impartial, unagitated and calm, and who fear next life, are religious-minded, active and devoid of anger.

27-28. If the Brâhmaṇa be not learned enough, the king should appoint a Kṣatriya (for the purpose), or a Vaiśya who is versed in Dharma Śâstras, but reject the Śûdra.

[1]29-30. The king should always appoint men of the caste to which he himself belongs, for most members of the royal caste are likely to be well-qualified.

31-32. The justices are to be conversant with actions, character and attributes of people, impartial to both enemies and friends, to know the duties of men and are to be truthful.

[2]33-34. Those who are not idle, who are masters over anger, passions and greed, and who speak gentle are to be appointed to offices by the king from all castes.

[3]35-36. The cultivators, the artisans, the artists, the usurers, corporations, the dancers, the ascetics and thieves should decide their disputes according to the usage of their guild, &c.

[4]37. It is impossible to detect them through others' help. So they are to be found out with the help of persons born of (*i.e.*, connected with) them.

38-39. The king, who desires his own welfare, should refrain from giving any decisive opinion in a dispute among Brâhmaṇas regarding the interpretation of a procedure of sacrificial ritual.

40. The king should have the cases of the ascetics investigated by the ***traividyas*** or those who are versed in the Vedas.

41. He should not himself decide the cases of those who practise the occult arts, through fear of exciting their anger.

42-43. The king should not offer advice to those who are versed in all branches of learning, those who are of superior caste and character and to the preceptors, masters and ascetics.

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[1] In ll. 23-32 the qualifications of men who are to study the cases and help the king in the administration of justice have been described. They are generally to be learned Brâhmaṇas, but if Brâhmaṇas are not available, may be chosen from any caste except Śûdras, especially from the royal caste.

[2] Ordinary officers may be chosen from any caste.

[3] कीनाश—Cultivators, श्रेणि—Corporations, guilds, company of traders or those dealing in some articles.

[4] Laymen cannot detect the character of these persons. So investigation regarding such persons should be carried on through members of those professions.

[1]44-45. The foresters are to be tried with the help of foresters, merchants by merchants, soldiers by soldiers, and in the village (affairs are to be administered) by persons who live with both parties (*i.e.*, neighbours).

[2]46-47. Those persons are the best judges of the merits of the case who live in the places where the two parties stand and where the disputed matters and grounds of quarrel exist.

48-49. The king should, however, appoint officers who are virtuous, well-tried and capable of bearing the burden of the administration of justice like bulls.

50-51. The assembly in which there are seven, five or even three Brâhmaṇas versed in human affairs, the Vedas and Dharma Śâstras is (august and solemn) like one on the occasions of sacrifices.

[3]52. The merchants who are judicious should be made hearers there.

[4]53. The man who knows the Dharma can speak whether appointed or unappointed.

54. He speaks the voice of God who knows the Śâstra.

[5]55-56. Either one should not come to the council (Court) or should speak truthfully. That man is a sinner who keeps silence or utters falsehood.

57-58. Those families, corporations or associations which are known intimately to the king should investigate other cases excepting robbery and theft.

[6]59-60. The *Śreṇis* (corporations) will try cases not tried by the *Kulas* (families), the *Gaṇas* (communities) will try the cases left by the *Śreṇis*, and the officers will try the cases not decided by the *Gaṇas*.

61-62. The councillors are superior to the *kulas*, and the *adhyakṣa* or chief officer in charge of justice is superior to the councillors. And the king is higher than all—the dictator of what should be done and what not.

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[1] Here is something like a trial by peers.

[2] This is the principle of local judges for local cases.

[3] Something like a jury of merchants is implied.

[4] Even outsiders who know the law can give their opinions on the cases in dispute.

[5] Outsiders are allowed the full liberty of attending courts of justice and giving their own opinions on the affairs in dispute. Besides, there is the regularly constituted jury of merchants. This account of the administration of justice anticipates the modern practice in some very important points.

[6] The कुल, the श्रेणी and the गण are the three successively higher organisations of self-adjudication. When and where these three fail the king with his officers is to interfere.

[1]63-64. Superior intelligence grows gradually through the investigation of cases of low, average and high importance.

[2]65-66. The man who has studied only one Śâstra cannot investigate a case properly. So in all cases the king should appoint men who know good many Śâstras.

67. What only one man says can even be the law if he is spiritually minded.

68-69. The cases have to be tried by the king separately with men of various grades of intelligence once, twice, thrice or four times.

70-71. The man who can satisfy the plaintiff and defendant, the councillors, the clerk and the audience by his good methods of work should be an assistant.

72-73. The ten requisites in the administration of justice are the king, officers, councillors, *Smṛiti Śâstras*, accountant, clerk, gold, fire, water and one's own men.

74-75. That court is like a heaven in which the king notices these ten requisites and studies the cases.

76. The functions of these ten are being mentioned separately.

77. The *Adhyakṣa* is the speaker, the king is the president, the councillors are the investigators.

78. *Smṛiti* tells of the rules about recital of *mantras*, penance and gifts, &c.

79. Gold and fire are intended for the swearing of oaths, and water for the thirsty and the nervous.

80. The accountant is to count the money. The clerk is to write properly.

81-82. The accountant and the clerk are to be versed in lexicon and the significance of words, well up in accounts, honest, and trained in the use of various alphabets.

[3]83-84. A court of justice is that place where the study of the

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[1] The lowest officers and organisations have to try the most insignificant cases and their intelligence, therefore, is of an inferior grade. Those that are higher in the judicial scale have to display a higher grade of skill in order to be able to cope with the higher responsibilities entrusted to them. So there is a regular grade or hierarchy of intelligent beings.

[2] Human and social affairs being very complex cannot be investigated by a single science. The Judges should, therefore, be masters of many arts and sciences in order to discharge their duties satisfactorily.

[3] अर्थशास्त्रs are the sciences of the secular interests of man. The place which investigates these interests according to the धर्म्मशास्त्र is the धर्म्माधिकरण.

social, economic and political interests of man takes place according to the dictates of Dharma Śâstras.

85-86. The king should enter the court modestly together with the Brâhmaṇas and the ministers who know state-craft, with the object of investigating the cases.

87. He should proceed with the work after taking the seat of justice.

88. He should put questions to the parties by being equal to both.

[1]89-91. The king should perform his duty by carefully studying the customs that are followed in countries and that are mentioned in the Śâstras, as well as those that are practised by castes, villages, corporations, and families.

[2]92-93. Those customs that have been introduced in the country, caste or race should be maintained in the same condition, for otherwise the people get agitated.

94. In the southern countries maternal uncles' daughters are married by Brâhmaṇas.

95-96. In Madhyadeśa the artisans and artists are beef-eaters, men are all flesh-eaters, women are addicted to intercourse with others than their own husbands.

97. In the North the women drink wine and are touchable when they are menstruated.

98. People of Khasa country marry the widows of their brothers.

[3]99. These people do not deserve penance and punishment because of these actions.

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[1] In deciding upon a case and performing his स्वधर्म्म, *viz.*, the administration of justice, the king should be very circumspect. He should carefully find out the customs that are local, temporal, social, domestic, national, etc. For धर्म्म differs not only with time and place but also with जाति, श्रेणी and कुल.

[2] Śukrâchâryya always advocates the maintenance and preservation of the customs of the folk—a very sound maxim for winning the heart of the people. He is thus not a supporter of the theory of absolute virtues and vices. According to him diametrically opposite practices may be both good if they are customarily followed by certain sections of the community. What is praiseworthy in one locality may be condemnable in another. But the king must be a respecter of the laws of nations, and should not abolish the vestiges of past life or national characteristics in the mania for introducing uniformity.

[3] In ll. 94—8 a few customs are narrated. These are absolutely local and racial, says Śukrâchâryya. They are practised as virtues or, at any rate, not inconsistent with a strictly moral and civilised life according to the ideas obtaining there, though they may be despised in other parts of the same country and by other races. Thus what people in one part of the country would regard as absolute unchastity, thorough depravity and most heinous social crime or objectionable domestic practice, peoples in other parts follow as though quite social and moral.

[1]*100-101. Those whose customs have been received by traditions and were practised by their ancestors are not to be condemned for following those customs, not others.*

102-105. In Kali Yuga the king should repress those by severe punishments who are covetous of others' wives and wealth, who are proud of their little learning, and little fortune, habituated to the rites and practices of Tantras, and apathetic to the Vedas.

[2]106. The king should administer Nyâya in the noon and Smṛiti in the morning.

[3]107-108. But for cases of murder, thieving, robbery and felonies there is no fixed time. These should be adjudicated at once.

109 111. Seeing the king seated on the throne together with his ministers, the plaintiff should go to him after carefully considering or writing out what he has to inform him or what has been injured by somebody.

112. He should bend low and submit his petition by folding his hands in submission.

113-114. The king with the ministers after receiving him duly should first console and appease him and then commence the trial (discharge his duty).

115-117. He should then inquire of the plaintiff standing before him submissively 'What is your business? What is your grief? Don't be afraid. By which ruffian, when and under what circumstances have you been oppressed?'

118. Having thus interrogated him the king should hear what he says.

119. The clerk should write down his statements in the character and language which are prevalent.

120-121. The clerk who writes anything different from what is said by the plaintiff and the defendant should be chastised by the king boldly as a thief.

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[1] Having described certain local usages Śukrâchâryya is referring to some long-standing customs. If certain usages have been handed down from generations and are practised among certain peoples by tradition they are not to be held as offenders. But other persons who have not those traditions are to be punished if found practising them.

[2] Morning is the time for adjudicating cases which involve application of the socio-religious regulations laid down in the Smṛitis and daytime is fixed for cases which involve the breach of laws made by the king, etc.

[3] Serious cases to be tried immediately.

122. The councillors should not speak or accept what has been thus (wrongly) written.

123. The king should punish like thieves those persons who extort written statements from anybody.

124. In the absence of the king the chief justice should put these questions.

125-126. The *Prâḍvivâka* is so called because he asks questions (and is therefore *Prât)* and analyses cases, judges disputes or states what should be done and what not (and is therefore *Vivâka*).

127. Those who are good for councils are councillors.

[1] 128-129. If oppressed by enemies with means transgressing the law and the established usage, a person complains to the king, it will form the subject-matter of law-suit.

[2] 130. The king should never himself fabricate a false case, nor even his officers.

[3] 131-132. The king should not through passions, greed, anger or his own information try cases that have not been presented for judgment.

133-134. But he should even without any complaint take up for adjudication cases of *chhalas* (misdemeanour), *aparâdhas*, felonies and cases in which the king himself is a party, on hearing of these through *Suchakas*, *Flatterers*, and *Stobhakas*.

135-136. A *Stobhaka* is he who not appointed by the king, gives first information of a crime, for the sake of money,—a conduct censured by the Śâstras.

138-139. The *Suchaka* is he who has been appointed by the king to know of others' offences and after knowing them informs the king.

[4] 140-141. Destroyers of roads, slanderers, those who jump across one's walls, destroyers of water-reservoirs and of houses,

142-143. Those who fill up the ditches, publishers of king's imperfections, trespassers into inner apartments, trespassers into bedrooms, trespassers into store-rooms, trespassers into the kitchen, those who stand by dinners without appointment,

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[1] If somebody is injured by others through measures antagonistic to Smṛiti and Âchâra, and if he applies to the king for redress there is a complaint or व्यवहार formed.

[2] The Government is to take no cognisance of affairs unless presented by the interested parties.

[3] The king is not to take the initiative in those matters. He should try only those cases (कार्ये) that are brought before him for adjudication.

[4] निपान—Water reservoir. The enumeration of the छल, अपराध, which the king is himself to bring up for adjudication, like that of the arts and sciences, also gives a socio-economic picture of the ancient times.

[1]145-146 Those who spit or commit nuisance or pass wind before the king intentionally, those who sit in heroic postures before the king, those who sit in the front of the king,

147-148. Those who dress themselves better than the king, those who approach the king impatiently and in an unmannerly way, those who enter by backdoors, those who come at the wrong hour,

149-150. Those who sleep in royal beds, those who use royal seats, those who use king's shoes, those who sleep before the king, those who sit before the king, those who climb before the king, those who sit before the king lying on the bed,

151-152. Those who serve the king's enemies, those who sit without seats offered by the king, those who use others' dress, ornaments and gold, &c.

153-154. Those who take betel of themselves and begin to chew it, those who talk or speak without permission, those who insult or defame the king,

155-156. Those who appear before the king with only one cloth, those who come when rubbing oil, or with dishevelled hair, who come shamelessly, or with painted bodies or with garlands on or while shaking the clothes,

157-158. Those who come before the king with head covered (by a turban), those who are skilled in picking holes in others' pockets, those who are addicted to gambling, drinking, &c., and those who try to see their noses, ears and eyes,

159-160. Those who pick teeth, those who cleanse the ear, those who blow the nose before the king,—these are the fifty sorts of *chhalas* or discourtesy shown to a king.

161-162. Disobeying the king's orders, murder of women, intermixture of castes, adultery, thieving, pregnancy without husband,

163-164. Harshness of words, speaking slang, severity of punishment, and the destruction of fœtus—these ten are *aparâdhas* or felonies.

165-166. The wrong-doer, the destroyer of grains, the man who sets fire to houses, the seditionist, the man who counterfeits coins,

167-168. The man who discloses the king's secrets, the man who rescues the prisoner, the man who sells or makes a gift or partitions the property of another of which he is not the owner, or who punishes another,

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[1] These are offences against the moral sense and social etiquette of the community.

169-170. the man who stops the beating of drums (public proclamations), falsely claims unclaimed goods, or who misappropriates the king's taxes, and mutilates bodies—

[1]171. These are the twenty-two cases, which the sages say, are *Râjajñeya*, *i.e.*, offences against the State.

172-173. The complainant should be punished if he be insolent, vehement in speech and ferocious in dress, vain, and rough, sit on the seat of the judges and is boastful.

174. An *Âvedana* or plaint is that which is said to the king by the plaintiff.

175. The language in which it is said to the *Prâdvivâka* should be very intelligible.

[2]176-177. The councillors having got that case should interrogate the plaintiff duly, should have more evidences (than presented by him) or curtail their number.

178. The king should have the depositions signed by the complainant and then seal it with his seal.

[3]179-181. The king should by exemplary punishment deprive those judges and officers of their jurisdiction who without carefully considering the cases pass sentences through fear, greed or passions.

182. The king should first discriminate the cases as to their cognisability before (accepting them for trial).

183. The king should dismiss the plaintiff after his plaint has been duly framed and accepted.

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[1] The twenty-two include the 10 *aparâdhas* together with the offences mentioned in M. 165-70.

These twelve are offences against the State or commonwealth while the अपराधs are mainly offences against society, morality and religion, whereas the छलs are offences against the person of the king.

The राजज्ञेय offences must be brought for trial at the king's own initiative because the Government itself is the party offended against. The छलs are offences against the king himself, and therefore unless he himself takes cognisance of these, these would remain unpunished, and people would forget manners, etiquette and the rules of civilised life. The अपराधs are offences against the community, and as the king is the guardian of morals and religion and head of the society it is his function to find out the breaches of social discipline or the perpetration of serious social crimes.

[2] पूर्वपक्ष—The complaint, the case brought forward by the accuser, the case.

The judge should demand for more witnesses if necessary and curtail their number at times.

[3] स्मृत्यर्थं—In order that they may remember their offences in carelessly trying the cases.

[1] *184-188. The plaintiff should by royal order appoint truthful, honest, active and well-armed men to keep under detention the defendant (who refuses to make certain statements and ignores his complaint) until he is summoned for trial and examination.*

[2] 189-190. The detentions as regards to certain places, times, foreign countries, and activities—these are the four kinds of *âsedha* or detentions. The man, who is thus forbidden, must not go beyond them.

[3] 191-192. The man who goes beyond the limits of *âsedha*, in binding down the defendant by restraining his calls of nature or harsh words and treatment should be punished.

[4] 193-194. The man who violates the *âsedha* and the periods of *âsedha*, *i.e.*, breaks the restrictions imposed upon his liberty should be punished. If doing otherwise, the man who imposes the *âsedha* should be punished.

195-196. The king should summon by warrant or by officers the man against whom people complain as having committed or threatened some wrong.

[6] 197-198. The judicious man should suspect men from their associations, past deeds or marks of offence.

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[1] वक्तव्यैर्—Who talks irrelevant and does not stick to the questions asked of him, *i.e.*, evades them and refuses to make statements.

उत्क्रामन्तं—Who ignores or defies his plaints.

आसेधयेत्—Should bring under control, bring to bay.

[2] आसेध—Limitations of movements.

(1) स्थानासेध—Certain places are forbidden, the prisoner is confined to certain places.

(2) कालासेध—Periods of time during which the prisoner will not be free to do anything he likes but will be compelled to commit or omit certain things.

(3) प्रवासासेध—Distant places forbidden. The man will not be allowed to go beyond a certain area.

(4) कर्म्मासेध - Certain activities forbidden. The man will be bound down to preserve peace, will not be allowed to speak certain things, &c.

[3] The आसिद्ध or 'bound down' man must not be prevented from responding to calls of nature. He must not be accorded an unnecessarily cruel treatment in words and actions.

[4] The prisoner or the defendant should be punished only in the act of violating the restrictions imposed upon him.

[5] तत्वेन—Actual commission. मुद्रया—Warrant issued over the king's signature.

[6] Grounds of suspicion :—

(1) Bad companions, (2) अनुभूतकृति—Known habits, (3) होढ़ा—Stolen goods. If they are found on somebody's possession he is caught red-handed.

[1]199-201. The king should not summon diseased people, children, old men, men in danger, men with many activities, those who fear the failure of works undertaken, those who are busy with the king's affairs and festivities, drunk, mad, foolish, and sick servants.

202-203. The young maids who have no relatives, high class ladies, women who have just delivered children and are in the lying-in room, high caste girls, women whose masters are not unknown,

204-205. Persons about to be married, the sickly, persons about to undertake sacrifices, persons who are accused in other cases, persons doing work for the State,

206-207. Cowherds tending the cattle, agriculturists in the harvest seasons, artists and artisans at their work, and soldiers in times of war,

208-209. Minors who are not yet masters of their affairs, messengers, persons engaged in charitable works, men in danger—these men are not to be bound down and not to be summoned as witnesses.

210-211. If the bound-down man violates the limitations imposed upon him when swimming a river, crossing a forest or going through a difficult region or in times of revolutions, he is not guilty (and should not be punished).

212-213. After knowing the circumstances of the case, the time, place, as well as the importance of the events, the king may summon the diseased (and others who have been mentioned above as not to be summoned) by conveyances in important cases.

214-215. The king should also summon in serious cases those who have retired to forests after knowing of the complaints against them.

[2]216-218. Representatives have to be appointed by the plaintiff and defendant who do not know the legal procedure or who are busy with other affairs, or who are not good speakers, who are foolish, mad and old and females, children and the diseased.

219. Friends also may be appointed to answer queries.

220-221. The king should accept cases even if they are brought forward by father, mother, friend, brother, and other relatives.

[3]222-223. If somebody has a thing done by somebody appointed by him, the work done by the latter is known to be done by the former.

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[1] आकल्य—Diseased. कार्य्यातिपातव्यसनि—Those who fear lest there be a failure of works already undertaken.

[2] Pleaders and lawyers are to represent such persons and state their cases as their own.

[3] The theory underlying the appointment of the pleaders is this. For the time being they become the defendant's and complainant's other selves so to speak, become in fact the defendants and complainants. The proxy becomes the original by a sort of legal fiction for the purposes of answering queries and asking questions.

224. The lawyer's fee is one-sixteenth of the interests involved (i.e., the value defended or realised).

225. Or the fee is one-twentieth or one-fortieth, or one-eightieth or one hundred and sixtieth portion, &c.

226. Fees to be small in proportion as the amount of value or interest under trial increases.

227. If there be many men who are appointed as pleaders in combination they are to be paid according to some other way.

228. Only the man who knows the law and knows the Dharma should be appointed (as pleader).

[1]229. The king should punish the pleader who receives fees otherwise.

[2]230. The pleader is to be appointed not at the will of the king.

231. If the pleader acts otherwise through greed he deserves punishment.

232-233. If somebody is neither a brother, nor the father, nor son, nor a pleader, but speaks on others' interests (*i.e.*, for or against the two parties) he should be punished.

234-235. Those women who are subordinate to the king, prostitutes, those who have no families, and those women who are degraded may be summoned to the court.

236-237. If after the plaint has been lodged the two parties die, their sons who know of the case should be the cognisable parties; otherwise the king should withdraw the case from trial.

238-241. In the cases of murder, thieving, adultery, taking forbidden food, abduction, harshness, forgery, sedition and robbery there are to be no lawyers as representatives (of the defendants). The perpetrators are to answer personally.

242-243. The king should punish according to offence the man who does not respond to summons owing to the vanity of his men and money.

[3]244-245. Having noticed that the defendant who has been brought by the messenger has other engagements the king should take suitable security for his appearance.

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[1] अन्यथा—Does it mean other than the rate fixed or "other than धर्म्मज्ञ and व्यवहारज्ञ"? He may be punished if he takes exorbitantly or if he practises without knowing the law, &c.

[2] The king cannot appoint any pleader he likes to a case. It is the interested parties who should engage the services of the lawyers in whom they have confidence.

[3] प्रतिभू—Security, one who stands bail. नियोगी, नियोगकृत्—pleader who represents the case.

[1]246-248. 'I shall pay what is not paid by this man, I shall present him before you (at certain dates), I shall make him present a pawn. You have no fear from him. I shall do what is not done by him. Such and such is his occupation (and means of living). He does not swear falsely.'

249-251. The *Pratibhu* or security is to be taken from both parties. He is to be non-slothful, a good speaker, trusted by the people, renowned, wealthy, and capable of investigating cases.

252-254. To prevent forgery and fabricating false evidence, the king who wants truth should keep both the parties under detention for studying the case. They may be maintained by themselves or by the State but will have to maintain their families with their own incomes.

[2]255-256. Men versed in legal affairs know a *sâdhya* to be the case that is free from unintelligible propositions and attended with good evidence, and the *pakṣa* to be the 'object' or person who is definite and human.

[3]257-258. The defects of language (*i.e.*, statements) are ambiguity, meaninglessness, absence of evidence and arguments, under or over-statement, and omission.

259-260. One should give up the following defects of *pakṣa* or 'subject-matter of law suit,' *viz.*, uncommon, *niravâdha* (vexatious and frivolous), useless, contradictory, incomprehensible.

[4]261-262. An *aprasiddha pakṣa* (uncommon) is that which was never seen or heard of by anybody, *e.g.*, "I have been cursed by the dumb, tortured by the son of a barren lady."

263-265. 'This man reads or sings sweetly, and enjoys in his own house, this man has his gate on the street near my house' this is known to be a *niravâdha pakṣa* (frivolous).

266-268. The following is *niṣprayojana* (useless): 'This my son-in-law enjoys with my daughter,' 'This barren woman does not bear child,' 'Why this dead man does not speak.' These are known as *asâdhya* and contradictory respectively.

269-270. 'People do not sympathise with me in my grief and pleasures.' This is *nirartha*, *i.e.*, worthless.

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[1] These are the statements of the man who stands bail before the king. He has to promise certain things in these words.

वृत्तिमान्, etc.,—who promises and guarantees that the party has 'credit' and is a reliable man. आधि—pawn, mortgage.

[2] लोकसिद्ध.—The object must not be non-human. Only human objects are cognisable.

[3] Here are the possible defects प्रतिज्ञादोष of which the सिध्य must be free.

[4] Such are impossible or absurd statements.

271-272. The plaintiff who after having mentioned his case gives that up or contradicts himself by taking some other side is a mean man and must be punished.

273-274. After the *pûrvapakṣa* or plaint has been determined, corrected according to what is acceptable and what is not, and well discussed, the *uttarapakṣa* or the defendant's version is to be written.

[1]275-276. The plaintiff is to be questioned first, then the defendant. The chief justice is to receive answers to the queries through the officers.

277-279. The reply to the plaint is to be written in the presence of the plaintiff so as to cover the whole case and give the essential points in no vague words and in a manner intelligible without comments.

280-281. That reply is inadmissible which is doubtful, too little, or too much and partial, *i.e.*, covers only an aspect of the case.

282. One should not say anything unless asked, otherwise one is punishable.

283-284. The defendant who does not reply to the plaint presented, is to be controlled by the application of *sâma* and other means.

285-286. By cross-questioning should be disclosed those facts which may have been suppressed by both parties in their statements through wickedness or ignorance.

287-288. There are four kinds of reply--admission, denial, *pratyavaskandana* (admission with justification) and *pûrvanyâyavidhi* (res judicata).

289-290. A confession of judgment or admission or *pratipatti* is that in which the defendant acknowledges as real what has been said by the complainant.

291-292. The denial is that in which the defendant after hearing the plaint objects to it, whether in point of fact or language.

293-294. 'I do not know of it,' 'this is false,' 'I was not there then,' 'I was not born then.' These are the four species of denials.

[2]295-296. A *pratyavaskandana* is that in which the defendant while admitting the statements of the plaintiff, justifies them owing to the existence of other facts.

297-298. The *pûrvanyâya* or *prâṅgnyâya* is that in which the past history of the case is referred to, *e.g.*, in which the defendant says that in this very case the plaintiff was defeated by him sometime ago (res judicata).

299-300. *Prâṅgnyâya* is of three kinds. I shall prove by presentation of the old judgment, or evidence of the officers and judges or by witnesses that I defeated him on the last occasion.

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[1] The councillors and officers are to cross both parties.

[2] It is something like an intellectual tug of war between the two parties.

301-302. Those officers who do not receive the statements of the two parties in the presence of each other are punishable like thieves.

303-304. A *kârana* is the document of the actions (*kriyâ*) of both the parties after these have been recorded, corrected, and made faultless.

[1]305-306. The four divisions of a case are first, the *Pûrvapakṣa* or plaintiff's statement, secondly, the *Uttara* or reply of the defendant, thirdly, the *Kriyâ* or actions of the two parties in the conducting of the suit, and lastly, the *Nirṇaya* or decision and judgment.

307. The *Sâdhya* or case is said to be *Kâryya* or the thing to be done. The *Sâdhanâ* or means adopted to do the thing is said to be *Kriyâ*.

308. The plaintiff should establish his case in the third quarter by the *Kriyâ*.

[2]309. The *Vyavahâra* or a law-suit has four divisions, if there be no *Pratipatti* or admission.

310-312. The cases should be tried in the order of their arrival, or of their importance, or of the gravity of injuries suffered and losses sustained, or of the castes.

313-317. The assessors after considering the defence should give their opinion with regard to the party on whom lies the burden of proof. He on whom lies the burden of proof should prove the point at issue with all the evidence at his command, documentary and otherwise. In a dispute between two, the evidence of both cannot be true. The evidence of one must be false, if the other is right.

318. In the case of a reference to the past history of a suit by *Prâṅgnyâya* (res judicata) the defendant will have to present his *Kriyâ* (the means for proving it).

319-320. Some time owing to certain reasons the burden of proof may be shifted from the first to the second party. At this stage the plaintiff should immediately write down the evidence in support of his case.

321. That *Sâdhana* or evidence is two-fold, human and divine.

322. The human evidence is three-fold—documentary, possessory and oral.

323. When the human *Sâdhanas* (evidences) have failed he should use the divine ones like ordeals of the pot, &c.

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[1] **पाद्—A quarter. The four quarters or divisions of a case are enumerated here.**

[2] **प्रतिपत्युत्तर True reply as described above. If the reply is true the case is punished then and there, *i.e.*, at the second stage. But if the defendant be not so honest, the case has to be dragged through all the stages.**

[1]324. Both *bhûta* (human) and *bhâvya* (divine) *Sâdhanas* are two-fold according to *Tattwa* or reality and *Chhala* or fiction.

325. *Tattwa* is that which describes the truth. *Chhala* is that which describes the false things.

326-327. The king should study the cases after always removing the *Chhalas* by reasoning, inference and the application of *Sâma* and other methods.

328-329. The king should not delay in taking evidence. If there be delay there will arise great defects which may lead to the miscarriage of justice.

[2]330-331. The king should record the evidences (*Sâdhanas*) in the presence of both parties, should not receive them in their absence.

332. The defects of the evidences have to be pointed out by the defendant.

333. The deeper meanings of the evidence are to be made clear by the councillors by referring to the *Sâstras* at the proper time.

334. The man who complains against somebody without any reason is punishable and should be deprived of his suit.

335. After having carefully considered the evidence the king should decide upon the case.

336. The producer of false evidence should be punished according to the offence.

337. The man who bears false evidence and the man who suppresses evidences are to receive double the punishment (of the producer).

338. Now I am describing the written evidence *Likhita Sâdhana*, (and other evidences) in due order.

339. Writing was created by Brahmâ as a reminder of past events.

340-342. The *Likhita* or written document is of two kinds—royal

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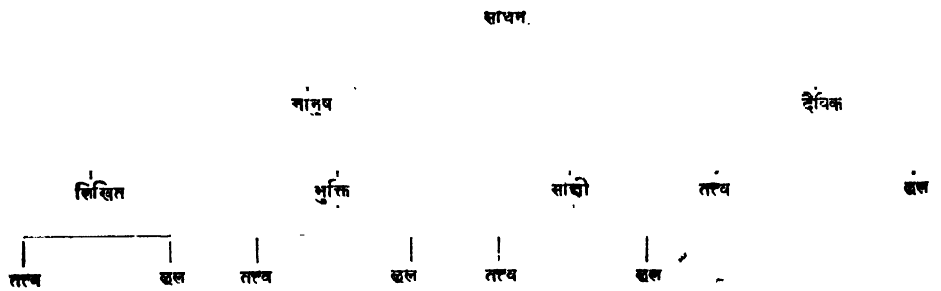
[1] Each of **दैव,** and **मानुष** *Sâdhanas* may be real and fictitious.

[2] The *Sâdhanas* or evidences enumerated above are given in the following table :—



The **लिखित** are described in ll. 337-63, the **साक्षी** in 364-416, the **भुक्ति** in 432-49, the **दैविक** in 450-451.

and popular, whether recorded with one's own hands or by others, and whether before witnesses or without witnesses. They are to be prepared according to customs of the locality.

343-344. The seven popular *Likhitas* are about partitions, gifts, sales, acceptance, receipts, *Sambiddâna*, and debts.

344-345. Royal commands are of three kinds, meant for administration, information or decision.

346-347. The *Bhâgapatra* or the document of partition is valid if it has the witnesses, and the approval of the heirs. Otherwise even if made by father it is as good as not done.

348-349. The documents of gifts, sale and purchase about immoveable goods are valid only when approved by the receivers and having the *Grâmapas* or village officers as witnesses.

350-351 The royal documents are those that are signed and sealed by the king and signed by the *Prakritis* or departmental heads.

352-357. There should be mention of time, year, month, fortnight, *tithi* (day of the moon's age), period of the day, province, district, place, caste, size, age, the objects, the evidences, the goods, the number, one's own name, and the king's name, residence, names of the other party, names of ancestors, the griefs (or injuries sustained), the collector, or the giver and the signs of mercy, &c.

358. The document which does not mention all these is *Hîna* or poor (*i.e.*, not valid), *e. g.*,

359-361. The documents which are disorderly (in which the facts have been mentioned without any order), which mention the facts in the reverse order, which are unintelligible, which are useless, and which are written after the expiration of the period of transaction, are not valid, as well as those which have been written by senseless people, females, or by force.

[1]362-363. In *Vyavahâras* men attain success if documents are made on good paper, attested with good witnesses, etc., and accompanied with possession.

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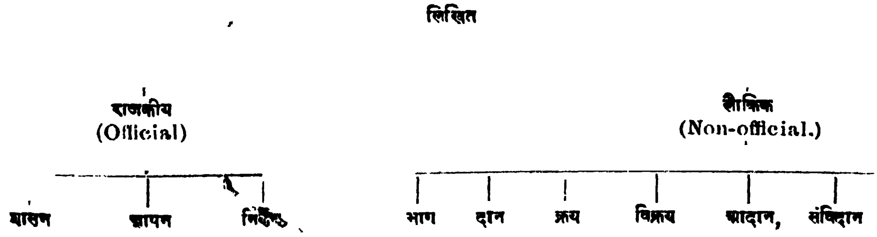
[1] The लिखितs or documents are enumerated below :—



364-365. *The man other than self who is aware of the facts of the case is a witness. The witness is of various classes—one who has seen or who has heard of it, each again is divided into two classes—got-up (false) and true.*

366-367. The man by whom facts are seen or heard in the presence of the plaintiff and the defendant may be a witness if he be uniform in statements.

368-369. The man whose intelligence, memory and ears do not prove defective even after a long time deserves to be a witness.

370. The man whose truthfulness has been tested deserves to be a witness.

371. Even one man if virtuous is adequate when approved by both parties.

372. Men should be witnesses according to caste and race.

373-374. Householders, not the dependants, wise men, those who are not abroad, and young men should be made witnesses. Females should be appointed in cases involving female interests.

[1]375-376. Witnesses, however, need not be discriminated in the following cases—violence, thieving, felonies and abuse, assault and kidnapping.

377-378. The child because of his ignorance, the women because of mendacity, the forger because of sinful habits; the relatives because of their affection, the enemies because of their rivalry.

379-380. The man who belongs to an inferior caste or race because of his vanity, the cheat because of his cupidity and the servant because of fees and bribes—these people are not to be witnesses.

[2]381. Not also those with whom one has money transactions, with whom one has marriage relations and those with whom one has educational relations.

382. If somebody is prejudiced with the *Śreṇis* (communities) or *vargas* (groups) of men, his evidence is not to be taken. For men like him are all enemies.

384-386. The king should not lose time in talking with the witnesses, and should make them give evidence in the presence of both the plaintiff and the defendant—never in their absence.

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[1] **The conditions as to who are to be witnesses are to be enforced only under certain circumstances, not always. There are several cases *e.g.*, साहस in which witnesses need not conform to the above conditions.**

The following lines mention the persons who are not to be witnesses.

[2] **शिष्य *i.e.*, pupils, or school-fellows, or teachers.**

387. The man who, when ordered, does not bear witness is punishable.

388-389. And the man who was not present or who has not been summoned or ordered to say what he knows is punishable whether he talks truth or falsehood.

[1]390-391. If there be a division or difference the king should accept the verdict of the majority; if there be equality or sameness, he should accept the opinions of the virtuous, and always the opinions of those who are well qualified.

392-393. A person present in court must depose truly as to what he has seen or heard, when asked, even though he may not have been cited as a witness.

394-395. The witness should say separately what he has known separately in different times, this is the eternal practice.

[2]396-397. One should accept the evidences of witnesses which are given spontaneously not through force; after the evidence has been once given by the witness he should not be repeatedly crossed.

398-400. The witness should be interrogated after being well governed by oaths, the teachings of Purâṇas, narration of the great merits of virtuous life, and the great sins of falsehood.

401-402. 'Where, when, how, whence and what have you seen or heard—whether written by oneself or caused to be written by somebody? speak truly all that you know.'

403-404. The witness who gives true evidence attains happy life hereafter and unrivalled fame in this world. This is the remark of Brahmâ.

405-406. It is truth that blesses the witness. It is truth that increases virtue. So it is truth that should be spoken by witnesses with reference to all castes.

407-408. Oneself is one's own witness, oneself is one's own protector. So you should not degrade and insult your ownself (by false evidence).

409-410. The sinner thinks 'Nobody is noticing me.' But the gods and the manes see you.

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[1] The principle is pre-eminently modern.

[2] If the evidence has been clearly set forth once the witness should not be teased by unnecessary questions.

411-412. All the virtues that you have earned in the series of births you have passed through belong to the man whom you thwart by false evidence.

413-414. You also acquire all the vices committed by him during one hundred lives. In this way the king should advise the witness in public.

415-416. One should give sufficient time for the consideration of the evidences presented, according to their nature, whether divine or royal.

417-418. If the written documents be missing the cases should be investigated with the help of evidence by possession and witnesses. If the documents as well as witnesses be wanting only the possession should be used. And if possession evidences fail, the documentary evidences and witnesses should be used.

420-421. The king should never investigate cases with only one kind of evidence *e.g.*, by mere possession or document or witnesses.

422-423. The ingenious cheats can easily produce duplicates of the documents (by forging). Hence on the strength of the documents alone no point can be absolutely gained.

424-425. So also solely on the strength of witnesses no case can be won, because of their affection, greed, fear, anger and falsehood.

[1]426-427. Again there are men who on the strength of mere force enjoy goods whether unclaimed or belonging to others (than themselves). So a case cannot be won by mere possession alone

428-429. One should suspect only such cases as have grounds for suspicion, not otherwise. The king should punish like thieves the officers who are foolishly suspicious.

430-431. Through over-suspiciousness great calamaties come up. People are disintegrated, and virtue and business suffer.

[2]432-433. Possession can be a sufficient evidence when it is attended with income for a long time without opposition and always in the presence of the defendant.

434-435. When, however, the man simply declares that he is in possession but never receives the income there is a case of pretended possession and the man is a thief.

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[1] In the last six lines arguments have been advanced to show that all the three kinds of evidences, *viz.*, documents, witnesses and possession—may be vitiated each in its own way. So one only cannot constitute a title to something.

[2] सागम—With income, निराक्रोश—Without opposition.

436. Even title is no evidence which is not accompanied by possession however slight.

437-438. The owner of a small property who sees his moveables enjoyed by another openly for ten years, cannot get that back.

439-440. The man whose land has been enjoyed for twenty years by others, even if he be powerful, cannot get that back.

441-442. The king should punish as a thief the sinful man who holds the property of another for many hundred years even without title.

443-444. But the property which is ceaselessly enjoyed for sixty years even without title cannot be claimed back by anybody.

445-446. The following cannot be destroyed by length of adverse possession: mortgage, boundary land, minor's property, trust property, sealed deposit of female slaves, Government property, and property of a learned Śrotriya.

447-448. The owner who is indifferent (to his property), and remains silent (*i.e.*, does not prohibit the trespasser) cannot get back by a lawsuit that property, on the expiry of the above period.

449. Possession has thus been briefly narrated. Now the divine *Sâdhanas* (ordeals) are being mentioned.

450-451. When through the heedlessness of the owner, there does not exist the threefold evidence and the opposite party conceals the truth, then is to be applied the threefold procedure mentioned hereafter.

452-453. First repeated persuasion (to the opposite party to be fair), secondly, Yukti thirdly, ordeal (or divine test),—these should be applied in succession to prove one's case.

454-455. *Yukti* (or probability and expediency) is that which is based on right argument, unopposed to scriptures and usages of the good, and which is employed to achieve one's end: but not anything else.

456-457. Rewards, distinctions, dissensions, and temptations are the various acts which cause the mind to change. (These means may be employed to weaken the case of the adversary and to induce him to tell the truth).

458-459. Persuasion must be constant and repeated, heedless of the remarks of the opposite party. For though refused thrice, four times, or five times, at last the adversary may yield and turn to right.

460. Even when *Yukti* fails the divya *Sâdhana* (ordeal) has to be used in the investigation of cases.

461-2. The methods are known to be *divya* because these were used by the great *devas* or gods in the discrimination of difficult cases.

463. The seven *Ṛishis* also recognised them as purificatory means.

464-5. The man who through vanity of learning does not have recourse to the *divyas* adopted by men like *Vasiṣṭha* is an irreligious man.

466-7. The gods undoubtedly take away half the merits of the Brahmana who thro'vanity does not swear by the *divya* method even when it is presented before him.

468-9. On the other hand the man who desirous of his purgation has often recourse to *divya* is purified and does attain fame and heaven, otherwise not.

470-1. In the matter of decision of cases by the *divya*, fire, poison, vessel, water, virtue and vice, rice and oaths—these are prescribed by the sages.

472-3. The preceding ones are more weighty than the succeeding, and should be employed according to the importance of the case. But really all divyas are weighty.

[1]474-7. The (accused) has to walk nine steps with a hot ball of iron in the hand or has to walk seven steps on hot charcoal, or has to take out a quantity of iron placed in hot oil by the hand, or has to lick by the tongue a very hot iron plate.

[2]478. The accused has to swallow poison or catch the poisonous snake by the hand.

[3]479. He has to be measured against something of equal weight and then to correct(?) either diminution or increment(?).

[4]480-1. He has to drink the water taken from that used in bathing his auspicious gods, and afterwards to be immersed in water for a certain period.

[5]482. He has to touch or take away the images of Dharma and Adharma without seeing them.

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[1] These are the methods of using Fire in the *divya* method of trial. Having described the fire-ordeal in these lines Śukracharyya is describing the other *divyas* in succession.

[2] These are the two methods of the Poison-ordeal.

[3] The man has to be placed in the balance twice. If there be any discrepancy in the two measurements his guilt is proved. The जल or water-vessel mentioned in l. 470 must be huge enough, to contain substances, *e. g.*, water, grains &c. equal to a man's weight.

[4] This is the water ordeal. If the man does not get suffocation, soon, he is innocent, it appears. अश्नत् should eat, here drink. Before being immersed in the water he has to quaff off a quantity of the sacred water inorder to be impressed by the gravity of the occasion.

[5] This is the धर्म्माधर्म्म ordeal. Two images are placed before the accused, one personating virtue and the other vice. The man is blind folded and required to touch or take away the images in that plight अदृष्ट If he touches the virtue he is innocent, otherwise guilty.

[1]483. He has to chew without anxiety or fear one *Karṣha* amount of rice.

[2]484-6. He has to touch the feet of superiors, or heads of children, or coins or swear by the gods ' Let me be cursed with the burden of sins, let all my merits be extinguished.'

[3]487. Fire is prescribed is cases involving thefts of one thousand, poison in one fourth less, balance in one-third less, water in half that amount, virtue and rice in half the preceding (*i.e.* one-fourth of the unit), Rice in one-eighth, oaths in one-sixteenth. This is the order of *divyas*.

[4]491-492. The above figures are meant for the worst (class of people), and it is declared in the Smṛitis that twice those (respective figures) should be taken (in the case) of the better class (of persons), and also four times that (in the case) of the highest (class of men).

493-494. When (the accuser) would not himself abide by the judicial sentence (in case the contrary is proved) then no ordeal is prescribed : it is well declared that the accuser should consent to abide himself by the judicial sentence (if the contrary is proved) in all the ordeals.

495-496. An ordeal is to be prescribed to the accused only, for that is so said in the Śruti, and never shall (a Judge) order an accuser to go through (any one of) the ordeals.

(?)[5]497. But the other, (namely, the accuser,) might, if he so wills it,

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[1] The Rice-ordeal declares a man guilty who in chewing the rice experiences difficulties through palpitation of heart or want of salivation &c. owing to excess of excitement or agitation.

[2] These are the four methods of oath-ordeal.

[3] The *Divya* methods of decision (*Nirnaya*) have to be used in the investigation of criminal cases in the order described in these lines. Criminal Law regarding thefts would thus require :—

		Rs.
(1).	Fire ordeal in suits of	1000
(2 .	Poison „ „	750
(3).	Balance „ „	666
(4).	Water „ „	500
(5).	Virtue and Vice „	250
(6).	Rice „ „	125
(7).	Oaths „ „	62

[4] Fire-test is to be applied for a theft of Rs. 1,000 by निकृष्ट, for Rs. 2,000 by मध्य, and for Rs. 4,000 by the उत्तम. And so on.

[5] A recent commentary proposes that शिरोवर्ती means सम्मुखस्थित:, that is to say, when one is undergoing the ordeal, the other party must stand in front of him. But we follow here the explanation of the Mitâkṣara (*vide* under II. 95), which says *śîrṣaka* or *śiras*, *(lit. head), is the last step of a law-suit, (that is,) decision, and signifies punishment; and he who would consent to abide by that (in case the contrary is proved) is one who resolutely urges the accusation, that is, śîrṣakastha.*

have recourse to ordeal, and (the party) other than he might press the accusation (against him).

[1]498-499. In the case of those who have been suspected by the rulers, those also who have been pointed out to (as offenders) by the enemies (of mankind) and (in the case) of those too who are bent upon proving their innocence, ordeal might be prescribed without the accuser standing in front.

500-501. In cases of adultery and incestuous intercourses in the prohibited (circle), and an accusation of having committed a mortal sin, ordeal itself (should be had recourse to), there is no (proof) otherwise.

[2]502. In the case of those on whom there was a presumptive charge of theft, the ordeal of lifting a small piece of metal from the boiling oily matter is ordained.

503-4. But when the case is an indictment for murder, though means of human proof there does exist, yet if the accuser would (of his own accord) have recourse to ordeal, then the (human) evidence should not there be inquired into.

[3]505-6. Where the means (of proof is such) as its honesty requires to be tried, and if such evidence is given before the king, the king having occupied the seat of justice shall test it by means of a suitable ordeal.

[4]507-8. Whatever document it is, if it is as good as any good legal document, in points of name, Gotra, etc. of the parties, but if no money was ever borrowed (by the defendant), there the decision is to be arrived at by means of an ordeal.

509-11. Where no human evidence is coming forward, the ordeal might be prescribed there, and also in such cases as offences committed in a forest, in a solitary place, at the time of night, or in an inner apartment, in the case of violence, in cases of accusations affecting the character of women, and the cases where every fact is denied (completely)[1].

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[1] Another interpretation of this verse : "(in the case) of those who have been pointed out to (as offenders) by the enemies (of mankind), who have been next suspected too by the rulers (as such), and who consequently are bent upon proving their innocence, ordeal might be prescribed without the (accuser) to stand in front."

N. B.—दस्यु, though generally taken to mean robbers, is yet translated as 'enemies (of mankind)' considering the various uses of the word in the Smṛiti literature.

[2] Tapta-mâṣa : see the Mitâkṣarâ II. 7.

[3] If the king hears that the other *sâdhanas* have been used dishonestly he should rectify them by *Divya.*

[4] Cases of forgery and false charges of debts.

The *Divya* is to be applied where, even in the absence of loans, documents are presented which resemble the actual ones in name, gotra &c.

512. When other evidences are extremely vitiated, they must be rejected and the honesty of the parties should be tested by means of ordeals.

513-4. In cases relating to mortal sins, theft of deposits, a king, notwithstanding there are witnesses, shall investigate the case by means of ordeals.

515-6. Where witnesses of the first class differ in their evidence, likewise the witness of the next class do so, and likewise do the witnesses other than that next class, that case shall be conducted by administering the oaths.

517-20. In disputes relating to immovable properties; in cases of disputes among unions of men, guilds, and companies; in cases relating to non-delivery of gifts; when a case has to be decided between servants and their masters; in a case relating to rescension of sales; and where having purchased a thing one does not pay the amount of its price, —these (disputes) one shall prove by witnesses, by document and by possession too.

521-22. In marriages, festivities, and gambling games, if a dispute arises, witnesses are the means of proof there, and neither an ordeal nor a document (is necessary).

523-4. In using a property as an entrance or path, mortgage, passage of water, etc., likewise, it is possession itself that is valid.

525-526. If one party would urge human evidence and the other party divine, the king should accept the human not the divine.

[1]527-528. If there be a human evidence which covers only a part of the case, even that is to be accepted, not the divine though that covers the full ground notwithstanding men urge it.

529-530. The six kinds of *Nirṇaya* or decision are through *Pramâṇas* (or evidences of witnesses, documents, &c.), reasons, usages, oaths, special orders of the king, and the admission by the plaintiff.

531-532. Where there is no document, no possession, no witnesses, and no resorting to ordeals, the king is at liberty (to proceed as it is best).

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[1] *Śukranîti* does not advocate the conditions of an over-theocratic life but represents the features of a pre-eminently human and rational state of things. Thus if two *sâdhanas* are brought forward—one human and the other divine, the human is to be accepted. Even if the human evidence be partial, that is more adequate than a couple *divya*.

533-534. In cases which are impossible to decide finally and which are of a doubtful character, *e.g.*, those relating to boundaries, &c., the king as the supreme lord is at liberty (to proceed as it is best).

535-536. Even the king is a sinner if he decides cases in an absolute manner: therefore he should administer the secular interests in harmony with the (spirit of) Dharma Śâstras.

[1]537-538. Judicial investigations are vitiated through the greed of the king and (his) ministers. People too are drawn away from the path of virtue and get addicted to fraudulent matters.

539-541. If a case proceeds through excessive passion, greed and anger it affects the parties, witnesses, judicial councillors, and even the king. Hence the king should cut off their root (*e. g.*, person, etc.,) and discriminate it well.

[2]542-544. If somebody presents as right to the king something which is wrongful and if the king accepts that as right without careful consideration, he is regarded as the real actor and gets eightfold sin.

[3]545-546. The councillors must not be indifferent to the immoral methods of procedure adopted by the king, for then they are thrown down hellward together with the king.

547-548. The *Dhigdaṇḍa* (moral disapprobation) and *Vâgdaṇḍa* (oral chastisement) these two are within the competence of councillors. *Arthadaṇḍa* or fines and corporeal punishment are within that of the king.

549-550. If somebody objects to the judgment as well as the decree of the king as against Dharma, he can have a re-trial on the depositing of double the fine.

[4]551-552. A re-trial or appeal may arise in those cases which have been vitiated by the undue pressure of witnesses and officers, and by the defects of the king's own actions.

[5]553-554. Whoever, an Amâtyâ or the President (of the judicial

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[1] If the king and officers be greedy, forgery, counterfeiting, etc., become prevalent among the subjects.

[2] The king must not accept the statements of informers without careful investigation as to their worth.

[3] The सभ्य must protest against the अधर्म of the king.

[4] The appellant may argue that the first trial was vitiated because of the defects of officers, defects of witnesses, and defects of the king himself as regards procedure, judgment, passing of sentence, &c.

अवसन्न —Oppressed.

पौनर्भव—Repetition of the case--appeal.

पुनर्दर्शन—Re-examination.

[5] The king really commits all these offences which are done by Amâtya, *Prâḍvîvâka*, &c.

assembly), would decide a case contrary to law, the king shall examine it again, while he should fine them a thousand.

555-556. Without punishment no one can walk in the right path. So when the offences of (judicial) councillors have been pointed out the king should take the case for re-trial.

557-558. A man is said to be successful when he can substantiate his case by arguments, gets the approval of the Judge, and receives the *Jayapatra* or document of victory.

559-560. The king should give to the victorious party the *Jayapatra* after it has been carefully analysed by the officers and accepted by the other party.

561-562. Otherwise the king should imprison the plaintiff for many years, and punish him according to the seriousness of the false charges and (similarly) honour him who is (falsely) accused.

563-564. The subjects follow that king, as the rivers the ocean, who investigates the cases according to *Dharma* by restraining his passions and anger.

565-566. Even the son who has got old age is not independent if the parents are alive: Of them, the father is superior for the seed is superior (to the field).

567. In the absence of father, the mother; in her absence, the elder brother.

568. Sovereignty (authority) can be given only to the eldest, and eldership comes through both qualifications and age.

569-570. One should respect those women as one's own mother who are the wives of father, and should maintain them all with a portion of property equal to his own.

571-572. Subjects are all dependent, the king is the sovereign authority. The disciple is dependent, the preceptor is independent.

573-574. The father has authority over sons and son's wives in the matter of discipline, but no right to sell or give away the son.

575-576. Among those who are dependent, all the (persons) mentioned above (as dependent) are always independent (in a way): they are admittedly their own masters in the matter of issuing command (where they can), and giving away or not giving away (what is their own).

577-578. The father is the lord of all gems, jewels, etc., but neither the father nor the grandfather has authority over all immovables.

[1]579-580. The wife, the son, and the slave—these three are *adhana*, *i.e.*, unpropertied (in the matter of family property). Whatever they earn is the property of those to whom they belong.

[2]581-582. A man is not the owner of the property because it is held by him. Is it not found in the case of thieves that somebody's property is being held by somebody else?

583. Hence ownership is to be admitted only if the Śâstras sanction, it is not brought about by mere enjoyment.

[3]584. Otherwise one should not say that so and so's wealth has been stolen by so and so.

585-6. In the Śâstras sources of income as well as the castes are known to be various and that Dharma of the Śâstras always binds even the Mlechchhas.

587. For the preservation of the community these have been fixed by previous sages.

588. Sons and wives are to be made equal sharers.

589. The daughter is to have half of the son's share, the daughter's son half of that.

590. Even if the father be dead, the sons, &c., are to receive their shares according to the above proportion.

591-592. The son should give one-fourth to the mother, one-half of that to the sister, one-half of that to the sister's son, and himself receive the remainder.

593-594. The son, the grandson, the wife, the daughter, the daughter's son, the mother, the father, the brother and the brother's son —these are to receive the wealth (in the order stated) each in the case of failure of the predecessor (in the list).

[4]595. Absolute right is given to women in the matter of wealth that is called women's wealth as regards sale, and gift, even in immovables.

597-598. The *Saudâyika* wealth is known to be that which comes to a married woman through gifts and dowries from parents' or husband's families or through presents by parents and relatives.

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[1] These persons are the chattels, so to speak. Their earnings belong to their master like themselves.

[2] Mere possession does not constitute property.

[3] One should not without careful examination charge anybody with theft.

[4] सौदायिक derived from स्वदाय, *i.e.*, one's own possessions—here referring to what is technically the *stridhana* or woman's property. The wife will have स्वातन्त्र्य absolute authority over her own wealth (स्त्रीधन) but not over the share which comes to her according to her position in the above order of claimants, *i.e.*, according to the legal share by right of succession. This absolute right pertains to even immovables.

599-600. The man who earns anything without the help of ancestral wealth can enjoy that at his own will. That is indivisible.

601-602. Anybody who can save somebody's wealth from absolute destruction owing to the ravages of deluge, thieves, kings and fire has right to one-tenth.

[1]603-604. The goldsmiths should get remuneration according to the labour undergone by each in cases where they combine to perform a work of art.

605. He is said to be a *śilpin* by the learned who is well-versed in his art.

[2]606-607. The leader or captain of those who combine to build a palace or a temple and construct canals or furniture is to get twice the share got by each.

[3]608-609. The remuneration of a musical party also is to be divided according to this principle. The *tâlajña* or one who beats time is to get one-half and the singers to have equal shares.

610-611. If thieves steal something from other's kingdoms by the king's order they should first give one-sixth to the king and then divide the rest among themselves.

612-613. If one of the gang is caught all the rest should spend equal sums in rescuing him.

614-615. Those who deal in gold, grains, and liquids (collectively) will have earnings according to the amount of their share, greater, equal or less.

616-17. Whatever portion is stipulated indeed (beforehand), equal, less, or more, that (shall be accepted) exactly so. Expenditure he shall pay and do the work (proportionately) and take the profit too (in the same manner).

618. The same principle (of joint-stock enterprises) applies to merchants as well as peasants.

[4]619-621. The common property, the wealth that has been realised by begging, security, mortgage, slaves, the property of slaves, *anwâhita*

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[1] निर्वेश—Remuneration, सम्भूय—by combining.

[2] Joint work, collective organisations, associations, etc., have been mentioned in Śukranîti, both in economic and political affairs of the *Śreṇis* and *Gaṇas* &c.

प्रमुख्य—The leader, master-craftsman.

[3] For references to music parties in Indian literature, see an article in the *Vedic Magazine* (March 1913) by the author.

[4] अन्वय—Family.

अन्वाहित—That which is deposited with a person to be delivered ultimately to another person.

(deposits) and the total wealth if there be children—these nine are not to be made over to others by the wise even in times of danger.

622-623. Those who receive what should not be given, and give what should not be given—both these classes of men are to be punished like thieves, and are to be made to pay the highest fine.

624-625. The man who receives wealth from thieves as well as those who are no masters and the man who purchases quite secretly (from them) are to be punished like thieves.

626-627. The priest who forsakes the householder without offence and the householder who forsakes the priest without offence—both are to be punished.

[1]628-629. A merchant should fix $\frac{1}{32}$nd or $\frac{1}{16}$th part as the profit in a business with due regard to the expenditure and to the conditions of the place and not more.

630. (One might advance money to one who intends to be a merchant) and not demanding the interest, he should make him carry on the trade with half the profits always.

[2]631-2. When (the amount) drawn from the debtor (in the form of) interest has reached twice the principal then the king shall make (the debtor) pay only the principal to the creditor and nothing more than that.

[3]633-634. Creditors take away people's wealth by the compound rate of interest. So the king should protect the people from them.

635-636. If somebody does not return the money to the creditor when he is able, the king should make him pay that back by applying the methods of *Sâma*, *Daṇḍa*, &c.

637-638. When the document in one's possession is lost, and he brings a suit for the recovery of debt then the king should well ascertain the truth by means of witnesses and make the debtor pay him as before (when the document had not been lost).

639-640. The man who receives what has not been given and again wants some thing though well paid —both of these are to be punished by the virtuous king.

641. The seller of bad (adulterated) goods is punishable like a thief.

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[1] प्रदेशानुरूपतः —The व्यय or expenditure is to be calculated according to the place of business, *i.e.*, transport and freight are also to be included in the Total Cost of production.

[2] *Cf.* Chapter V. 193.

[3] Here is something like State Intervention in *Credit*-affairs.

642. The king should give wages to artists after noticing their works and qualifications.

'643-644. The king should daily receive (as duty) from the sales of silver one-fifth, one-fourth, one-third or one-half—not more.

645. (When) one hundred *palas* (of gold) is taken and melted, it is pure if it still remains one hundred *palas* and does not become less.

646-48. Silver is diminished by four-hundredth part (when melted), copper (becomes) less by a hundredth part; tin, Jasada, and lead (each) is diminished by one-sixteenth part, and iron by one-eighth part, if it is otherwise the artisan should always be punished by the king.

649-51. In articles of the best workmanship gold is lost by a two-hundredth part of itself while silver by a hundredth part; and if soldered (by using) good material, (the weight) is increased by a sixteenth part.

652. Having examined the soldering and the workmanship, the increase or decrease should be determined.

653-654. The goldsmiths' wages is to be one-thirtieth (the value worked upon) if workmanship be excellent, one-sixtieth if mediocre, and half of that if of inferior order.

655. Wages to be half of that in the case of *kataka* (bracelet), and in the case of mere melting, half of that.

656-657. The silversmith's wages is to be half if workmanship be of the highest order, half of this if mediocre and half of that if inferior, and half of that if *kataka*.

658-659. The wages is to be one-fourth in the case of copper, zinc, and Jasada metal, half, or equal or twice or eight times in the case of iron.

660. The man who adulterates metals deserves double the punishment.

661-662. Customs originating with the sages in ancient times, have grown with the people in diverse ways, which it is impossible to describe.

663. The Section on Administration of the State has thus been described.

664. The merits and demerits not mentioned herein are to be known from popular usage.

The Rate of Royalty upon Mining.

SECTION VI.

FORTRESSES.

1. Now I shall narrate in brief the Sixth Section, that on Fortresses.

[1]2. Fortresses are made inaccessible through ditches, thorns, rocks and deserts.

[2]3-4. The *pârikha* fort is that which is surrounded on all sides by great ditches; and the *pârigha* is known to be that which is protected by walls of bricks, stones and mud.

5-7. The *vâna* or forest-fort is one which is encircled by huge thorns and clusters of trees, the *dhanwadurga* is known to be that round about which there is no water, the *jaladurga* or water-fort is that which is surrounded by great sheets of water.

8-9. The *giridurga* or hill-fort is described as that which is on high level and is supplied with plenty of water. The *sainyadurga* or troop-fort is that one which is defended by heroes well up in *vyuhas* or military tactics and hence impregnable.

[3]10. The *sahâyadurga* or help-fort is known to be that which belongs to the valorous and friendly kinsfolk.

[4]11-12. The desert-fort is superior to the *pârikha*, thence the *pârigha*, thence the forest, thence the *dhanwa*, thence the water, last the hill-fort.

[5]13. The *sahâyadurga* and the *sainyadurga* are the ornaments of all fortresses.

14. Without these the other forts are of no use to the king.

15-16. The fortress with soldiers is the best of all, the others are mere helps or auxiliaries to this; the king should therefore always keep this fort.

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[1] ऐरिण pertaining to ईरिण or deserts.

[2] मृद्भित्तिप्राकार embankments of mud wall.

[3] The forts have been described and classified according to two principles: (1) the physical difficulties or advantages of the site on which the fort stands, *e. g.*, forests, water &c., (2) the human inmates also *e.g.*, the troops, the allies, &c.

[4] Of course the arrangement here is in order of the difficulties presented to the enemy. The *parikha* or that which is protected by ditches only is described as being the lowest of all in this respect, and the hill-fort is the best.

[5] Undoubtedly the real strength of all forts is in the nature and mettle of the human element, the valour and character of the troops occupying them. Merely physical advantages are of no avail.

[1]17-18 One who has forts with troops can survey the whole earth; but to have every other kind of forts except those with troops is tantamount to imprisonment.

19. It is advisable to have recourse to other forts in times of danger or emergency.

[2]20-21. One man with arms can fight one hundred if (he gets the protection) of a fort; a hundred men can fight ten thousand, hence the king should have forts.

[3]22. To the valorous and to the people who live in forts with troops every place is like a fort.

23-24. The king should have forts well provided with war materials and contingencies, as well as grains, troops, arms and treasure.

25-26. The fortress which is manned by friends and allies is the best of all. Victory is sure when the fort is thus manned.

27. Whichever is thus manned by friends and allies is sure to lead to victory.

[4]28. The mutual dependence of forts and fortresses constitutes an element of success.

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[1] Of course one can easily appreciate the embarrassing situation in which the ruler is placed when he has forts with physical advantages only but no manly and friendly troops to defend them. It is obvious that under these circumstances the instruments of self-defence would be used by the enemies against their proprietors themselves, and forts would be their own prisons.

The distinction between the physical and the human elements is here carried to perfection.

[2] The efficacy of forts is described here. It is suggested that forts can multiply a warrior's strength hundred-fold. One man in a fort is equivalent to one hundred men out of it.

[3] People who depend on their own nerve can convert every place into a fort, *i. e.*, can walk erect everywhere without fear. It is the inward strength of a man that is his real fort.

[4] परस्परानुकूल्य' The forts should all be so situated and governed that there arise no difficulties of access from one to the other or conflicts of jurisdiction between them. The system of forts in the State should be placed on a sound basis of co-ordination and inter-relation.

In enumerating the factors of success or the circumstances that are likely to lead to success, Sukrâchâryya mentions two conditions :—

(1) The existence of सहाय *i.e.*, friends and allies.

(2) The well-ordered military system and governmental machinery which alone can place the forts in inter-dependent relations.

SECTION VII.

THE ARMY.

[This is a purely political chapter embracing many of the important topics dealt with in Treatises on International Law, especially in their sections on War.]

1. Forts have been briefly discussed, the Seventh Section, that on the Army is now being narrated.

2. The army is the group of men, animals, &c., equipped with arms, missiles, &c.

[1]3-4. The army is of two kinds: (1) that which proceeds independently; (2) that which has resort to vehicles, &c. Each, again, is of three kinds: (i) that pertaining to the gods; (ii) that pertaining to monsters; and (iii) that pertaining to human beings. The preceding ones are stronger than the succeeding.

5-6. The *swagamâ* army is that which moves without any help, the *anyagamâ* is that which proceeds in vehicles. The Infantry is the *swagamâ*, the other is of three kinds, using chariots, horses or elephants.

7-8. Without the army there is neither kingdom, nor wealth nor prowess.

[2]8-9. Even in the case of a man of no position, everybody becomes his tool if he has strength and becomes his enemy if he be weak. Does not this hold true in the case of rulers?

[3]10-12. Strength of the body, strength of valour and prowess, strength of the army, strength of arms, fifth is strength of intelligence, the sixth is strength of life. One who has all these is equivalent to Viṣṇu.

13. Without the army no one can overpower even an insignificant enemy.

Classification of सेना:—

सेना

स्वगमा　　　　अन्यगमा

दैवी　आसुरी　मानवी　　　　दैवी　आसुरी　मानवी

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[2] It is strength that converts foes into friends in the case of ordinary people (अल्पजनस्य or of a man who has few people *i. e.* of insignificant persons). So the king should always have strength, (*i. e.*, the army) and never be weak.

[3] The man possessing all these six kinds of strength is certainly super-human.

[1]14. The gods, monsters, as well as human beings have to depend on others' strength (*i. e.* strength of the army).

15-16. The army is the chief means of overpowering the enemy. So the king should carefully maintain a formidable army.

[2]17-18. The army is of two kinds—one's own, and that belonging to the allies. Each again is of two kinds according as it is—(*i*) long standing, or (*ii*) newly recruited, and also as it is—(*i*) useful, or (*ii*) useless.

[3]19-20. (The army is of two kinds): untrained or trained; officered by the State or not officered by the State; equipped by the state with arms, or supplying their own arms and ammunitions; bringing their own vehicles or supplied with vehicles by the State.

21. The army that belongs to the allies is maintained through good-will, one's own army is however maintained by salary.

22. The *maula* army is that which has been existing for many years, the *sâdyaska*, which is not that.

23. The *sâra*, efficient or useful army is that which is adept in warfare, the contrary is the *asâra*.

24. The trained army is that which is skilled in the *vyuhas* or military tactics, the opposite is the untrained.

25. The *gulmibhuta* army is that which has officers of the State, the *agulmaka* is that which brings its own chiefs.

26. The *dattâstra* army is that which receives arms etc. from the master, otherwise is the army which supplies its own arms and missiles.

27. The army regimented by the State, and the regiments formed among the soldiers by themselves; likewise the army receiving conveyances from the state (or not).

[4]28. The *kirâts* and people living in forests who are dependent on their own resources and strength (belong to the latter class).

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[1] Everybody requires assistants.

[2] मौल—old, existing from the origin or मूल of the State. साद्यस्क new, raw recruits.

[3] Two kinds of military recruitment are described here. The army of the State seems to have been divided into two classes: (1) the Standing army which must have been trained, regimented गुल्मीभूत or officered and manned by the Military Department of the State), and supplied with weapons and conveyances at State expense, (2) the national army of volunteers or the Militia which must necessarily be raw recruits, untrained, unregimented (*i.e.* having their own captains and lieutenants) and responsible for their own arms, accoutrements and conveyances. It would thus appear that the मौल army *i.e.*, that which is connected with the State, as it were, through roots, or from the beginning, would correspond to the permanent standing army of the kingdom, and the साद्यस्क or new army improvised for the occasions to the national Militia enlisted by the methods of conscription or voluntary service.

[4] It appears that the army of the State may be recruited from independent forest-tribes who do not ordinarily acknowledge suzerainty of the neighbouring chief. They of course bring their fighting apparatus.

[1]29-30. The troops left by, or captured from, the enemy and placed among one's own people as well as one's own troops tampered with by the enemy, should be regarded as inimical.

31. Each is weak, and not at all a help.

[2]32-33. Strength of the physique is to be promoted in the interest of hand-to-hand fights by means of tussles between peers, exercises, parades and adequate food.

34-35. The king should promote the strength of valour and prowess by means of hunting excursions against tigers (and big games) and exercises among heroes and valorous people with arms and weapons.

[3]36-37. The strength of the army is to be increased by good payments, that of arms and weapons by penances and regular exercises; and that of intelligence by the companionship of (or intercourse with) people learned in Śastras.

[4]38-40. The king should so govern his life that the kingdom may be permanent in his own dynasty through continuity of good deeds. So long as the kingdom continues in his family so long he is said to live.

[5]41. The king should have his infantry four times the cavalry, bulls one-fifth of his horse, camels one-eighth, elephants one-fourth of the camels, chariots half of elephants, and cannon twice the chariots.

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[1] भेदाधीन brought under the policy of भेद one of the four celebrated methods of Statecraft recognised in Hindu Niti Śâstras. When once the loyalty of the troops has been tampered with by the enemy and seeds of disaffection have been sown among them, there is no trust to be placed with them. The disaffected army is as good as the enemy's (and should be 'disbonded').

[2] समैः Equals, peers. नियुद्ध tug-of-war, hand-to-hand tussles. बाहुयुद्धाय Muscular strength is a desideratum for duels.

[3] In ll. 31-36 Śukrâchâryya has pointed out the proper method of developing the various kinds of military strength—(1) physical, (2) moral, (3) intellectual &c.

तपः Mantras and penances are prescribed for warriors in the use of missiles and weapons in all Hindu Treatises on Polity. *Atharva Veda* is the great and one of the first storehouses of these military charms and incantations.

[4] The king should try to perpetuate himself and thus augment the strength or longevity of his life. The method suggested is सत्क्रिया *i.e.*, the performance of good deeds. सत्क्रिया leads to popularity of the king and maintenance of the State in the same family for long. Thus the king himself lives long through posterity.

[5] The relative proportion of the constituents of the Army according to *Sukraniti*:

पादात (Footsoldiers)		=4 अश्व (Horse).
वृष (Bull)		=$\frac{1}{5}$ of "
क्रमलेक (Camel)		=$\frac{1}{8}$ of "
गज (Elephants)	=$\frac{1}{4}$ क्रमलेक	=$\frac{1}{32}$ of "
रथ (Chariot)	=$\frac{1}{2}$ गज	=$\frac{1}{64}$ of "
बृहन्नालीक (Cannon *i. e.*, artillery)	=2 रथ	=$\frac{1}{32}$ of "

[1]45-6. He should have in the army a predominance of footsoldiers, a medium quantity of horse, a small amount of elephant force, equal number of bulls and camels, but never elephants in excess.

[2]47-52. The ruler whose income is a *lac karsha* or one lakh of rupees should have every year one hundred reserve force of the same age, well-accoutred and decently equipped with weapons and missiles, three hundred footsoldiers armed with lesser fire-arms or guns—eighty horses, one chariot, two larger fire-arms or cannons, ten camels, two elephants, two chariots, sixteen bulls, six clerks, and three councillors.

[3]53-8. The ruler should every month spend one thousand and five hundred rupees on contingencies, charities and personal wants, one hundred on the clerks, three hundred on councillors, three hundred on wife

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[1] Here is a general remark about the definite proportion stated above. The bulls and camels may be equal in amount, the particular injunction about elephants should be noted.

[2] The annual military establishment of the ruler worth Rs. 1,00,000 which is regarded as the 'unit' of political life is described in these lines. It provides for :—

(1) 100 पृथक् or separate *i. e.*, reserve force.
(2) 300 Infantry with guns.
(3) 80 Horses.
(4) 1 Chariot.
(5) 2 Cannons.
(6) 10 Camels.
(7) 2 Elephants.
(8) 2 Chariots.
(9) 16 Bulls.
(10) 6 Clerks or Scribes.
(11) 3 Councillors.

[3] The monthly items of expenditure of the ruler worth one lakh have been given in these lines. The 'unit' of Disbursement in the annual budget gives the figures in the following schedule :

	Items.	Per month. Rs.	Per year. Rs.
(1)	Personal wants, enjoyments and charities etc	1,500	18,000
(2)	6 Clerks or Scribes	100	1,200
(3)	3 Councillors	300	3,600
(4)	Family	300	3,600
(5)	Learning and education	200	2,400
(6)	Horse and Foot	4,000	4,000
(7)	Elephants, Camels, Bulls and Fire-arms ...	400	4,800
(8)	Savings	1,500	18,000
	Total ...	8,300	99,600 (about a lakh).

It would be interesting to note the salary bill of clerks and ministers. It appears that about Rs. 16 a month is the rate for each clerk, and Rs. 100 a month is fixed for the highest officer of a State yielding Rs. 1,00,000. Incidentally we get an idea of what is known as the Standard of Life and Cmofort among the ancient Hindus.

and children, two hundred on the men of letters, four thousand on the horsemen, horses and infantry, four hundred on elephants, camels, bulls, and fire-arms, and save the remaining one thousand and five hundred in the treasury.

[1]59. The ruler should annually withdraw money from the soldiers for their accoutrements.

[2]60-63. The chariot that is to be kept by the State should be made of iron, easily movable by means of wheels, placed on a platform, provided with a seat for the driver in the middle, filled with weapons and missiles in the interior, fitted up with arrangements for producing shade at will, beautiful to look at, and furnished with good horses.

[3]64-67. Harmful elephants are those that have blue palates, blue tongues, curved tusks, or no tusks, who persist long in their angry moods, whose rut gushes out without any systematic order, who shake their backs, who have less than eighteen nails, and whose tails touch and sweep the ground ; good elephants have the opposite attributes.

[4]68. There are four classes of elephants—*Bhadra*, *Mandra*, *Mṛiga* and *Miśra*.

69-70. The *Bhadra* elephant is known to be that which has tusks coloured like honey (*i. e.*, not pure white but yellowish), which is strong and well-formed, is round and fat in body, has good face and has excellent limbs.

[5]71-72. The *Mandra* elephant is that which has a fat belly, lion-like

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There is another item to be noted in this schedule. This is about Learning and Education. Patronage of Education and Promotion of Learning by means of stipends, scholarships, rewards, honorariums etc. are compulsory items that cannot be neglected in the monthly State-Budgets. Men of letters are among the primary charges upon the income of the ruler. Hence there is a definite provision for them in the 'unit' of disbursement or the normal Budget of the one lakh standard.

[1] The soldiers have to pay for their own uniforms. But it appears that the State is to get these prepared and not to make the individuals responsible. The system seems to be that of granting liveries and uniforms from the State in exchange for the price to be paid by the soldiers. They cannot purchase these things in the open market at their own will.

[2] इष्टच्छाय:—The tent on the chariot should be foldable and portable if need be, so that it may be convenient to regulate it according to the rays of the sun.

[3] The science about elephants is highly specialised in India. Hindu drivers and veterinary doctors are well up in the rules of elephant life. There are several marks known to them by which they can interpret the internal character of these animals and forebode good or evil of the owner.

[4] The celebrated four castes (जाति) are to be met with in almost every Hindu system of classification. Cf. the classification of wood, trees, and boats.

[5] सिंहाक्षि—Eyes like those of the lion, *i. e.*, which turn towards the back and the sides at intervals.

eyes, thick skin, thick throat and thick trunk, medium limbs and a long body.

73-74. The *Mṛiga* elephant is that which has small or short throat, tusks, ears and trunk, big eyes, and very short lips and genital organ, and is dwarf.

[1]75. The *Mis'ra* elephant is that which has these characterisics in mixture.

[2]76. The three species have separate measurements.

77-78. In elephant measurements one *angula* is made by eight *yavodaras*, and one *kara* or cubit is made by twenty-four *angulas*.

79-80. In the *Bhadra* class the height or stature is seven cubits, the length is eight cubits, and circumference of the belly is ten cubits.

[3]81. The measurement of the *Mandra* and *Mriga* species are successively one cubit less than the preceding.

[4]82. But it is mentioned by sages that the lengths of the *Mandra* and *Bhadra* class would be equal.

[5]83-84. The best of all elephants is that which has long cheeks, eyebrows and forehead, has the swiftest speed, and has auspicious marks on the body.

[6]85. The horse measure is separate, as indicated by the ratio that five *Yavas* make one *angula*.

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[1] The *Misra* would thus be a non-descript, incapable of being classified or specified as belonging to a particular type.

[2] The relative proportions of limbs vary with the three classes.

[3] The height of the *Mandra* would thus be five cubits, that of the *mriga* could be five cubits. The length of the *Mandra* would be seven cubits, that of the *Mriga* would be six cubits. The circumference of the belly of the *Mandra* would be nine cubits that of the *Mriga* would be eight cubits.

[4] This is a special rule modifying that in the previous line. According to l. 81 the length of the *mandra* ought to be seven cubits, *i.e.*, one cubit less than that of *Bhadra*. But by this rule the lengths are equal. So *Mandra* is eight cubits long. Therefore *Mriga* is to be seven cubits not six as in l. 81.

The following measurements are to be noted in ll. 77-82.

(*a*) Elephant measure :--

8 Yavas	... 1 Angula.
24 Angulas	... 1 Kara.

(*b*) Comparative statement of limbs :—

	Bhadra.	Mandra.	Mṛiga.
Height	7 karas	6 karas	5 karas.
Length	8 „	8 „	7 „
Circumference of belly ...	10 „	9 „	8 „

[5] शुभलक्षण. But these लक्षण or marks have not been mentioned in the Treatise.

[6] In measuring horses people use a different standard from that used for elephants.

[1]86-89. *The best horse is that whose face is twenty-four angulas. The good is that whose face is thirty-six angulas. The medium is that whose face is thirty-two angulas. The inferior is that whose face is twenty-eight angulas.*

90. In horses all the limbs are made according to a certain proportion with the face.

[2]91-95. The height is three times the measure of the face. The length of the whole body from the crescent (top of the head) to the beginning or origin of the tail is four times the face together with its one-third. The circumference of the belly is three *angulâs* over and above three times the face. These are the general rules of measurement of limbs. Elaborate details are being given below.

[3]96-101. In the horse of the twenty-eight-angula-face, the height of the heel (hoof) is three angulas, the ankle-joint (fetlock) four angulas, the leg is twenty angulas, the knee is three angulas, the thighs to the end of the elbow are twenty-four angulas. The space from the elbow-joint to the neck is thirty-eight angulas. The back thighs are equal to the face, the back legs are less than the face by a quarter.

102. The height has been already mentioned. The length is now being described according to the Śâstras.

[4]103-104. The length of the neck is extensive, one-sixth in addition to twice the face. The height of the neck is one-fourth and half of that less than the face.

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[1] General remarks about the quality of horses :—

5 यव	1 अङ्गुल
The best horse has a face of	24 अङ्गुल
The good „ „	36 „
The medium „ „	32 „
The lowest „ „	28 „

[2] The limbs of the horses are to have a fixed proportion with the face. Ordinary horse-measurements are :—

Stature	3 faces.
Length	4⅓ „
Circumference of उदर	3 „ + 3 angulas.

[3] शफ heel or hoof. मणिबन्ध from heel to ankle.

चतुर्हस्ताङ्गुला angulas of four hands *i.e.*, 20 angulas.

कूर्पर elbow, here the joint which connects the thighs with the trunk.

प्रत्यक् back or hind. The back leg is thus twenty-eight minus seven or 21 angulas.

[4] सार्द्धपादहीना less than the face by ¼th and ½ of ¼th, *i.e.*, 28 − (¼+⅛) of 24 angulas or about 28-7-3 or 18 angulas.

[1]105-106. From the end of the neck to the origin of the genital organ the measure is equal to that of the neck. From there to the end of the vertebral column the space is one-half and one-sixth of the face.

107-108. The tail is half the face, the genital organ likewise, the testicles are half the tail and organ. The ear is six angulas long, may be four or five angulas also.

109-110. The circumference of the heel or hoof is one angula in addition to half the face. That of the portion just above is half of this, that of the legs is likewise.

111-113. The circumference of good thighs is eleven angulas according to the masters. The circumference of the back thighs is three times one-sixth. The outer aspect of the hind thigh and leg is to look like a curved bow.

114-115. The circumference of the hock at the ankle-joint is nine angulas. The circumference of the hind legs is equal to that of the fore-legs.

116-117. Space between two thighs is one angula. Breadth or width of the neck on which the hair grows is one and a half angula.

118-119. The mane should be made to grow beautifully downwards, to the extent of one cubit, from the space between the crown and the end of the neck.

120-122. The hair of the tail is one and a half cubit or two cubits. The length of the ears is seven, eight, nine or ten angulas, their width is three or four angulas.

123-125. The neck is neither fat nor flat but like that of the peacock. The circumference of the foreneck is one *mushti* or four angulas in addition to the face. The circumference of the origin of the neck (*i.e.*, where it comes out from the body) is twice the face minus ten angulas.

126-127. The good breast is one-third less than the face. The circumference of the forehead over the eyes is eight angulas in addition to the face.

128-129. The circumference of the face at the nose below the eye is equal to the face minus one-third.

130-131. The width of the eye is two angulas, their length is three angulas. Or the width two angulas and a half and the length is four angulas.

132. The space between two thighs is one-third face.

133. The space between the two eyes is one-fifth of the face.

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[1] **त्रिक end of the vertebral column. द्व्यंशषष्ठ $(\frac{1}{2}+\frac{1}{6})$ of 28 or 18 angulas.**

134. The space between two ears is likewise, as well as the space between an eye and an ear.

135. *The space between two heels, when the horse is standing* erect is equal to the length of the ear.

[1]136-7. The space between two eye-pupils, space between two eyes, as well as the space between the nose and the eye are one-third of the hind thigh.

138-9. The upper lip is one third of the face. The space between two nostrils is one-ninth of the same.

140. The body (from back to breast) is half of human height, and is equal to the breast at the end of the vertebral column.

141. The breast hangs low at the origin of the arms to the extent of one-fourth of the face.

142-3. The space between the arms at the breast is known to be one-sixth of the face. The lower lip is an angula and a half high together with the jaw.

144. That horse is beautiful which has a high neck and low back.

[2]145-7. If an image is to be made, the appropriate pattern or model should be always placed in front. No image can be made without a

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[1] सक्थि or hind thigh is 28 angulas. The space therefore is about 9 angulas.

[2] The following are the measurements given in ll. 96-144. The type taken is that whose face is 28 angulas, *i. e.* the lowest species.

(*a*) *Heights*

1.	Heel or Hoof	3	angulas.
2.	Anklejoint	4	„
3.	Fore leg	20	„
4.	Knee	3	„
5.	Fore thigh	11	„
6.	Thigh to neck	38	„
7.	Hind legs	28	„
8.	Hind thighs	21	„
9.	Neck	18	„

(*b*) *Lengths.*

1.	Neck	60	angulas
2.	Body	60	„
3.	From organ to end of vertebral column	18	„
4.	Tail	14	„
5.	Genital organ	14	„
6.	Testicles	7	„
7.	Ear	6, 4, or 5	„
8.	Mane or Hair of neck	1 cubit	
9.	Hair of tail	1½ or 2 cubits	
10.	Eye	3 or 4 angulas.	

model. So the artist should frame the limbs after meditating on the horse and finding out the measurements and attributes of horses in the manner indicated above.

149-53. The horse with divine attributes or excellent horse is that which has a beardless face, beautiful, smart and high nose, long and high neck, short belly, heels and ears, very swift speed, voice like the cloud and the gander, is neither very wicked nor very mild, has good form and colour and beautiful circular rings of feather.

154-55. Circular hair-rings or feather-rings are of two kinds—those turning leftwards or rightwards, full rings or partial rings, small rings or large rings.

[1]156-57. The hair ring that turns leftwards is auspicious in the

(c) Circumferences.

1.	Heel	... 15	angulas.
2.	Anklejoint	... 7½	„
3.	Fore leg	... 7½	„
4.	Fore thigh	... 11	„
5.	Hind thigh	... 88	„
6.	Hock of the anklejoint	... 9	„
7.	Hind leg	... 7½	„
8.	Forepart of neck	... 32	„
9.	End of neck	... 46	„
10.	Forehead	... 36	„
11.	Face at the nose below the eye	... 19	„

(d) Distances, breadth, width, or space.

1.	Between two thighs at the back	... 1	angula.
2.	The neck on which hair grows	... 1½	„
3.	Ear	8 or 4	„
4.	Breast	... 19	„
5.	Eye	2 or 2½	„
6.	Between two thighs	... 9	„
7.	Between two eyes	... 5	„
8.	Between two ears	... 5	„
9.	Between eye and ear	... 5	„
10.	Between two heels	6, 7, &c	„
11.	Between two pupils of eyes	... 9	„
12.	Between two eye brows	... 9	„
13.	Between eye and nose	... 9	„
14.	Between two nostrils	... 3	„
15.	Between arms at breast	... 4	„
16.	Lower lip	... 1½	„
17.	Upper lip	... 9	„
18.	Between back and breast	1 ¾ cubits.	

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[1] If the hair-rings have a rightward direction in female horses, the result is inauspicious. So if a male horse has hair-rings which turn leftwards the result is not satisfactory.

female horse, and that which turns rightwards in the male horse. Not the contrary.

158. Their results vary with the directions in which they are formed, *e. g.*, downwards, upwards or oblique.

[1]159-61. The auspicious marks made of hair or feather are the conch, wheel, mace, lotus, altar, seat of meditation, palace, gate, bow, pitcher full of water, white mustard seeds, garland, fish, dagger and Srivatsa gem.

162-63. Those horses are the very best which have these feathery shapes on the nose-tip, the forehead, throat and head.

164-65. Those are good horses which have these hair marks on the breast, neck, shoulder, waist, nave, belly and the front of the sides.

166-67. The *purnaharsha* horse is that which has two such marks on the brow and a third on the head.

168-69. The horse that has a mark on the backbone leads to the increase of the master's horses and is known as the *suryya* horse.

170-71. The horse that has three marks on the forehead is known as *trikuta* and leads to the increase of horses.

172-73. The horse that has three such feather spots on the neck is the *vâjeesha* or lord of horses in the royal stable.

174-75. If two marks are noticed on the cheeks of a horse they lead to the increase of fame and kingdom.

176-77. The horse that has however only one mark on the cheek is known as the *sarvanâma* and leads to the owner's ruin.

178-79. The horse that has a mark on the right cheek is known as the *siva* and leads to the happiness of the master.

180. The horse that has a mark on the left cheek is wicked and leads to loss of wealth.

181-83. The horses that have two spots on the ears are known as *Indra*, those that have marks on the nipples are known as *Vijaya* Both give victory in wars and lead to the increase of territory.

184-85. The horse that has two marks on the side of the neck is known as *Padma*; and that brings several Padmas (Padma=one thousand billions) of wealth as well as unceasing happiness to the master.

186-87. The horse that has one or three marks in the nose is known as *Bhupala* and *Châkravarti*.

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[1] If the feathers or hairs on the body of horses do assume some such shapes as are known to belong to the objects mentioned here, it is believed the proprietor will be happy. It thus appears that the marks on the horse's body need not all be circular. The भ्रमर s may be of any shape and size.

स्वस्तिक (1) Seat of meditation, (2) white mustard seeds.

188-89. The horse that has one large mark on the throat is known as *Chintamoni* and leads to the realisation of the desired objects.

190. The horses that have marks on the forehead and the throat are known as *Sulka* and give increase and game.

191-2. If the horse has marks in the mouth or at the end of the belly, it is sure to get death or causes ruin of the master.

193-95. The marks that are on the knees give the troubles of life abroad. That on the genital organ causes loss of victory and beauty. That on the end of the vertebral column means destruction of *trivarga, i.e.,* every thing.

196-97. The horse that has a mark on the orgin of the tail is ruinous and known as *Dhumaketu.* The horse that has a mark on the rectum, the tail and the end of the vertebral column is known as the *Kritânta.*

200-2. The marks are always bad if they are on eyes, jaws, cheeks, breast, throat, upper lip, kidney, waist, knee, genital organ, hump of the back, navel, right waist and right foot.

203-5. The marks are good if they are on the throat, the back, lower lip, space between ear and eye, left waist, sides, thighs, and fore legs.

206-7. Two marks on the forehead with space between indicate good and are like the sun and the moon. If they overlap they give medium results, but if they are too contiguous they are evil.

208-9. Three marks on the forehead with space between them one being on the top are indicative of good. But two marks very contiguous to each other are inauspicious.

210. Three triangular marks on the forehead are the causes of grief.

211. One mark in the middle of the throat is very auspicious and prevents all harms.

212. On the leg the downward mark is good, on the forehead the upward.

(?)213. A *Śatapadi* which is turned backward is not all regarded as inauspicious.

214-15. The mark on the back of the genital organ or the nipple is bad. That near the ear also is bad.

216. If the horse has a mark on one of the upper sides of the neck it is called *Ekarashmi.*

217. The horse that has an upward mark on the leg is disparaged as the uprooter of posts.

218. The horse that has both good and evil marks is known to be medium.

[1]219. The horse that has five white marks on the face and four legs is known as *Panchakalyâna.* The one that has in addition to these three marks on the breast, neck and tail is known as *Ashtamangala.*

220. The *Shyâmakarṇa* horse is that which has one colour throughout the body but has ears coloured *shyâma i.e*, greenish. If that one colour be white the horse is sacred and deserves to be worshipped.

223. The horse is known to be *Jayamangala* which has eyes like *vaiduryya* gem.

224. The horse may be worshipped, whether of one colour or of variegated colour, provided it is beautiful.

225. The horse with black legs as well as that with one white leg are disparaged.

226-28. The rough, grey coloured as well as ash-coloured horses are also despised. The horses with black roofs of mouth, black tongues, black lips, as well as those which are throughout black but have white tails are deprecated.

229-31. Those horses are good which run with legs thrown from a height, whose movements are like those of tigers, peacocks, ducks, parrots, pigeons, deer, camels, monkeys and bulls.

232-33. If the horse-man does not get tired by riding a horse even after over-feeding and over-drinking, the gait of the horse is known to be excellent, and the horse is also very good.

234-35. The horse that has one very white mark on the forehead but is throughout coloured otherwise is known as *dala bhanji*, the man who has such a horse is looked down upon.

23. All defects due to colour vanish if the horse has a decent aspect.

238. The horse that is strong, has good gait, is well-formed and not very wicked is much appreciated even if defiled by hair-marks.

[2]239-43. Defects grow in horses through long continued absence of work. But through excessive work the horse grows lean and emaciated by disease. Without bearing burden the horse becomes unfit for any work. Without food it becomes sickly, but with excessive feeding it contracts disease. It is the good or bad qualifications of the trainer that give the horse good or bad gait.

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[1] The five or eight white marks are so many auspicious signs.

[2] Some commonplace observations about food, exercise, work, training etc. of horses.

244-45 The good trainer is he who moves his legs below the knees, keeps his body erect, is fixed in his seat, and holds the bridle uniformly.

[1]246 47. The good trainer should strike the horse at the proper place by whips mildly and not too severely but with medium pressure.

248-50. He should strike the horse at the sides if it neighs, also at the sides if it slips, at the ear if it shies, at the neck if it goes astray, at the space between the arms if angry, at the belly if absent-minded.

251. The horse is not struck at any other place by experts.

252-54. Or one should strike the horse at the breast if it be terrified, at the neck if it neighs, at the posterior if it slips, at the mouth if going astray, at the tail if it be angry, at the knees if it be absent-minded.

255-57. One should not strike the horse very often or at the wrong place. One adds to the defects of the horse by striking it at the wrong time and place. Those defects exist so long as the horse lives.

258. One should overpower the horse by whips, should never ride a horse without a whip.

[2]259. The good horse should go one hundred *dhanu* in sixteen *mâtrâs.*

260. Horses are inferior according as their speed is lower (than the rate defined above).

261-63. The circle that is to be made for training the horse is of the highest class if one thousand *châpas* in circumference, is medium if half that size; inferior if half that, small if only one hundred *dhanus* in size, and very small if half that.

[3]264-65. The trainer should daily increase the movement or speed of the horse by exercises within the circular ring in such a way that it can run one hundred yojanas in a day.

266-67. One should ride the horse in the morning and evening in October and November, winter and spring, in the evening in summer, in the morning in autumn.

268. One should not use the horse in the rainy season nor on uneven grounds.

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[1] स्थाने at the proper place. The proper places are mentioned below.

[2] धनु:—4 Cubits. 100 dhanus make 400 cubits or 200 yards.

मात्रा—a period of time. 10 mâtrâs=4 seconds.

∴ 16 mâtrâs= $\frac{4\times16}{10}$ =6. 4 seconds.

∴ in 1 hour, about 64 miles. The rate seems to be exaggerated.

[3] योजन—4 miles. 100 Yojanas make 400 miles. But how does this rate tally with that given in l, 259 ?

269. The appetite, strength, prowess and health of the horse are promoted by well-regulated movements.

270-71. The horse that has got fatigue through work should be given a slight stroll for sometime, then should be fed upon sugar and powdered grains mixedwith water.

272-73. The horse should be given peas or grains, *mâsha*, *mungs*, both dry and wet, as well as well-cooked meat.

274. One should not use the whip at the places which have been wounded.

275-78. In the interest of its strength the horse should be given *gur* and salt just after work before the saddle and fittings are brought down. Then when the sweat has disappeared and it has stood calm and quiet the horse should be relieved of its fittings and reins.

279-80. The horse should be made to stroll in the dust after its limbs have been rubbed, and carefully tended with baths, drinks and foods.

281. Wines and juices of forest or wild animals take away all the defects of horses.

282. The horse should be made to take milk, ghee, water and powdered grains.

283-84. If the horse be made to carry burden just after taking food and drink, it soon contracts coughs and gasps and other diseases.

[1]285-86. Barley and pea constitute the best food for horses, *mâsha* and *makushtha* are good, *masur* and *mungs* are inferior stuff.

[2]287-88. The movements of horses are of six kinds—*dhârâ*, *âskandita*, *rechita*, *pluta*, *dhauritaka*, *valgita*; each has it own characteristics.

289. The *dhârâ* gait is known to be that which is very fast, in the midst of which a horse would get puzzled if spurred with the heels.

291-92. The *âskandita* movement of horses is known to be that in which the horse contracts its forelegs and runs with rapid leaps.

293. The *rechita* movement is that with short leaps but continuous.

294. The *pluta* movement is that in which the horse leaps with all the four legs like the deer.

295-96. The *dhauritaka* movement is rapid movement with uncontracted legs very useful in drawing chariot.

297-98. The *valgita* movement is that in which the horse runs with contracted legs, neck raised like that of the peacock, and half the body trembling.

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[1] Several country grains, mainly pulses are mentioned here.

[2] These technical terms are being explained below.

299-300. In bulls the circumference of the belly is four times that of the face, the height or stature together with the hump is three times the face and the length is three times and a half of the face.

301. The bull that is seven *tâlas* in height is appreciated if possessing all these attributes.

302-3. The bull that is neither idle nor wicked but a good beast for carrying burden, has a well-formed body and a good back, is the best of all.

304-5. The camel that is strong-built, has a good face, is nine *tâlas* in stature, carries burden and goes thirty *yojanas* a day, is appreciated.

306-7. The age of one hundred years is the maximum for men and elephants.

307. The young age of both men and elephants extends up to the twentieth year.

308-9. The middle age of man extends up to the sixtieth year, that of elephants to the eightieth.

310-1. The maximum age of horses is thirty-four years. That of bulls and camels is twenty-five years.

[1]312-3. The young age of horses, bulls and camels extends up to the fifth year. Their middle age extends up to the sixteenth year, old age since then.

314. The age of both bulls and horses is to be known from the growth and colour of teeth.

[2]315-20. In the first year of horses six white teeth grow. In the second year the lower teeth get black and red. In the third year both the front teeth become black and this goes on till the sixth year. In the fourth year the two teeth by the side of the two front teeth are replaced by new teeth. In the fifth year the last two (molar) teeth are replaced and these blacken from the sixth year.

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[1] The following table gives these distinctions between the various periods of life, viz. youth, manhood, old age, as pertaining to men, elephants, &c.

	Maximum age.	Youth.	Middle age.
Man	100 years	20 years	60 years
Elephant	100 „	20 „	80 „
Horse	34 „	5 „	16 „
Bull	25 „	5 „	16 „
Camel	25 „	5 „	16 „

[2] Thus in the course of five years the whole dental structure of horses is replaced. With the replacement of the natal teeth infancy is closed and middle age begins.

321-24. The teeth gradually yellow from the ninth year and *whiten from the twelfth year, become transparent like glass from the fifteenth year, have the hue of honey from the eighteenth year* and of conch from the twenty-first year. The last continues till the twenty-fourth.

[1]325. Since twenty-fourth year the teeth get loose and separated, and begin to fall down in threes.

326-27. The horse that has attained full age gets three circular rows on the upper lip. The age is to be considered low in proportion as the rows are less.

[2]328-29. The bad horses are those that throw kicks, make sounds with lips, shake their backs, tend to go down into water, suddenly stop in the midst of a movement, lie down on the back, move backwards and leap up.

330. As well as those that have snake-like tongues, the colour of bears, and are timid in character.

[3]331. The horse that has a mark on the forehead disfigured by a minute blot (of another colour) is depreciated, as well as that which tears asunder the ropes.

332-35. All the eight white teeth of bulls grow in their fourth year. Two extreme (molar) teeth fall down and are replaced in the fifth year: in the sixth year the next two, in the seventh the next two, and in the eighth the central two.

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[1] The changes in colour of horse's teeth as indicated in ll. 315-25 are given below :—

Age	Colour.
1st year	white.
2nd year	black and red.
3rd year—6th year	black.
6th—9th year	black.
9th—12th year	yellow.
12th—15th year	white.
15th—18th year	glass.
18th—21st year	honey.
21st—24th year	conch.

[2] These are some of the vicious habits of wicked horses.

[3] छिद्र hole in the तिलक (mark) on the भाल (forehead). The hole here is a spot or blot of another colour which disfigures तिलक or main mark on the brow.

आश्रयकृत् which cuts the means of keeping the horse under control, *e. g.*, destroys the fastenings, fittings, ropes, posts, reins, &c.

[1]336-37. Every two years the teeth get black, yellow, white, red and conch-like in order. Then their looseness and fall commence.

[2]338. The age of camels also has to be understood from considerations like these.

339-40. The hook with two mouths, one for movement forward and the other for movement backward has to be used in controlling the elephant. The driver should use this instrument for regulating the movements of the animal.

341-44. [Description of the bridle or reins]. The horse is to be controlled by such a bridle.

[3]345. The bull and the camel have to be governed by strings with which the nose can be pulled.

346. An instrument with seven sharp teeth is to be used in cleansing (or rubbing) these animals.

347-48. Men as well as beasts have to be always governed by adequate punishments. The soldiers have to be controlled by special methods not by fines.

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[1] Each colour lasts for two years. As all the teeth get finally replaced in eight years, the colour changes up to the 18th year (2 years for every colour).

[2] In ll. 77-338 we have been supplied with studies of animals for domestic as well as military use. The elaborate details about their size, shape, proportion of limbs, feeding, training, age, movements, medical treatment etc. though not quite relevant in a treatise on purely political subjects, are however called for according to the scope of the subject-matter which the author has taken up for himself. *Sukraniti* is a very comprehensive work as all Hindu social and human treatises are. As such it deals with all matters that directly or indirectly concern the main subject, *viz.*, the promotion of human and social well-being.

The whole sub-section on the Animal—Force of the Military Department of the State gives a concrete picture of the exact manner in which the War establishment is governed. The various sciences and practical arts connected with the life-history, habits, habitats, food, diseases, external and internal characteristics have all been laid under contribution, and the account is incidentally suggestive of the vast knowledge of the animal world that the Hindus displayed in the specialised treatises, if any, on the animals. Zoology, Veterinary Science, at any rate, their practical, aspects must have been highly developed, thus testifying to the genius of the Hindus for the inductive sciences of the physical, objective world. Some of these Biological treatises of the Hindus *e. g.*, those on elephants, plants etc. have already acquired celebrity in connection with Ayurveda. In order that full justice may be done to the achievements of the Hindu sages in physical sciences those specialised treatises have to be edited and published. Works like *Sukraniti* can only suggest and indicate the lines of inquiry by pointing to or hinting at the existence of Hindu scientific works of a really technical character dealing with animals, minerals, and vegetables of the earth.

[3] The instruments by which the animals are governed in their movements are the hook, the bridle and the strings.

349-50. The horses and bulls are well kept in watered lands, *the camels and elephants in forests, the foot soldiers in ordinary or public places.*

351. The ruler should station one hundred soldiers at every *yojana.*

[1]352-53. The elephant, the camel, the bull, the horse are excellent beasts of burden in the descending order. Carriages are the best of all conveyances except in the rainy season.

354-55. The ruler should never proceed with a small army even against an insignificant enemy. The wise should never use the very raw recruits even though they are in great numbers.

[2]356-57. The untrained, inefficient and the raw recruits are all like bales of cotton. The wise should appoint them to other tasks besides warfare.

[3]358-59. The weak ones desert the fields when they fear loss of life. But the strong ones, who are capable of causing *vikâra* or flight, do not.

360-61. The man who has no valour cannot stand a fight even if he has a vast army. Can he stand the enemy with a small one ?

362-63. The valorous man however can overpower the enemy with a small but well-trained army. What can he not achieve if he has a large army (at his back) ?

364-65. The king should proceed against the enemy with the standing or old, trained and efficient troops. The veteran army does not desire to leave the master even at the point of death.

366-67. Alienation (of soldiers) is caused by harsh words, diminution of wages, threats, and constant life and work in foreign lands.

368-69. Since there can be no success if the army be disaffected, one should always study the causes of disaffection or alienation of the army belonging to oneself and also to the enemy.

370-71. The king should always by gifts and artifices promote alienation or disaffection among the enemy's troops.

372-73. One should satisfy the very powerful enemy by service and humiliation, serve the strong ones by honours and presents, and the weak ones by wars.

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[1] प्राक् previous ones are superior to the succeeding.

[2] Here is a very strong advice against the use of raw inexpert recruits (like volunteers improvised for the occasion) in any warfare, even if the enemy be really very insignificant.

[3] विकारं to do quite contrary to what one is expected to do, here deserting the field.

[1]374. He should win over the equals by alliance or friendship and subjugate all by the policy of separation.

375. There is no other means of subjugating the foe except by causing disaffection among their soldiers.

[2]376-77. One should follow *niti* or the moral rules so long as one is powerful. People remain friends till then; just as the wind is the friend of the burning-fire.

378-79. Deserters from the enemy should not be placed near the main army. They have to be employed separately (in other works) and in wars should be used first.

380. The allies' troops may be placed in the front, at the back or the wings.

381-82. *Astra* is that which is thrown or cast down by means of charms, machines or fire. *Sastra* is any other weapon, *e.g.*, sword, dagger, *kunta* &c.

[3]383-85. *Astra* is of two kinds, charmed or tubular. The king who desires victory should use tubular where the charmed does not exist, together with the *sastras.*

386-87. People expert in military instruments know of diverse agencies named *astras* and *sastras* varying according to short or large size and the nature and mode of the sharp edges.

388. The *nâlika* (tubular or cylindrical) *astra* is known to be of two kinds according to large or small size.

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[1] भेद or policy of separation by which the army is alienated with the ruler, the people estranged from the sovereign, the friends get rivalries &c. is the most powerful weapon to be used by a king. It is the universal engine for overpowering enemies and controlling friends and neutrals. The advice given in these lines is too obvious.

[2] The great question whether Might should follow Right or Right Might has ever been debatable. In all questions of practical politics, adaptation to the environment in order to promote the interests of one's own national culture, and the employment of all those means which lead to that are the recognised maxims of statesmen. So that the doctrine of Machiavelli about Political Morality is, after all, the only certain and universal truth. Sukrâchâryya's advice that Right or Morality shines well only when and as long as there is might, just as wind blows vehement only when and as long as the fire is burning powerfully, finds its counterpart in all doctrines of political 'expediency' that have been preached in the world in various guises since time immemorial. In order that you may attract friends and display your morality you must be powerful. In other words, Might is the Right. *Sukranîti* has never advocated the principles of universal truth and absolute morality. These depend on the exigencies of circumstances, the sole standard always being the promotion of social well-being.

[3] नालिक The instrument which has a tube or cylinder &c., mechanical

[1]389-94. The short or small *nâlika* is the cylindrical instrument to be used by infantry and cavalry, having an oblique (horizontal) and straight (perpendicular) hole at the origin (breech), the length of five *vitastis* (two cubits and a half), a sharp point (tila) both at the forefront (muzzle) and at the origin, which can be used in marking the objective, which has fire produced by the pressure of a machine, contains stone and powder at the origin has a good wooden handle at the top, (butt) has an inside hole of the breadth of the middle finger, holds gunpowder in the interior and has a strong rod.

[2]395-96. The instrument strikes distant objects according as the bamboo or bark is thick and hollow and the balls are long and wide.

[3]397-99. The large *nâlika* is that which has a post or wedge at the origin or breech, and according to its movements, can be pointed towards the aim, has a wooden frame and is drawn on carriages ; if well used, it leads to victory.

[4]400-404. Five *palas* of *suvarchi* salt, one *pala* of sulphur, and one *pala* of charcoal from the wood of *arka*, *snuhi* and other trees burnt in a manner that prevents the escape of Smoke *e.g.*, in a closed vessel have to be purified, powdered, and mixed together, then dissolved in the juices of *snuhi*, *arka* and garlic, then dried up by heat, and finally powered like sugar. The substance is gunpowder.

[5]405-406. Six or four parts of *suvarchi* salt may also be used in the preparation of gunpowder. Sulphur and charcoal would remain the same.

[6]407-408. The balls are made of iron with other substances inside

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[1] The description tallies with that of a modern gun, the great presumption being that the lines are interpolations.

ग्राव stones, बुध्न handle. अग्निचूर्ण gunpowder, मध्याङ्गुल &c. the hole must be such that the middle finger can penetrate it. बिलान्तर space within the hole (barrel).

[2] त्वक्सार bamboo or bark. It seems that the cylindrical instrument is made of bamboo. But *cf.* ll. 409-10. Distance or of the aim depends on the length &c. of balls as well as diameter of the instrument.

[3] Here is the description of a cannon.

[4] The chemical composition of gunpowder is given here. *Suvarchi* is a salt like alum. अन्तर्धूम which keeps the Smoke inside.—Is it the process of "Destructive Distillation' ?

The proportion of the constituents :—

Salt ...	... 5 parts
Sulphur	... 1 part
Charcoal	... 1 part

The above mixture + juices of plants give the desired object.

[5] Here is another preparation. The substances are the same, but the quantity of salt to be used varies.

[6] It appears the iron balls are made for cannon.

or without any such substance. For lesser *nâlas* or guns the balls are made of lead or any other metal.

409-410. The *nâlâstras* may be made of iron or of some other metal, have to be rubbed and cleansed daily and covered by armed men.

[1]411-15. Experts make gunpowders in various ways and of white and other colours according to the relative quantities of constituents :— charcoal, sulphur, *suvarchi*, stones, *harital*, lead, *hingul*, iron filings, camphor, *jatu*, indigo, juice of *sarala* tree, &c.

416-17. The balls in the instruments are flung at the aim by the touch of fire.

418. The instrument has to be first cleaned, then the gunpowder has to be put in, then it is to be placed lightly at the origin of the instrument by means of the rod. Then the ball has to be introduced, then the gunpowder at the ear. Fire is next to be applied to this powder, and the ball is projected towards the objective.

422-23. The arrow is to be two cubits in length and to be so arranged that it can pierce the object when flung from the bow-string.

421. The mace is to be octagonal (in shape), to have a strong handle, and high up to the breast.

425. The *pattisha* is long as the human body, has sharp edges on both sides, and a handle.

426. The *ekadhâra* is slightly curved and four *angulas* in width.

427. The *ksharaprânta* is high to the navel, has a strong first, and the lustre of the moon.

428. The dagger is four cubits, has a rod as the handle and is edged like the razor.

429. The *kunta* is ten cubits flat and has a handle like *sanku* or stick.

[2]430. The wheel is six cubits in cirumference, has razor-like edge and a good centre.

431. The *pisha* is a rod three cubits long, with three sharp needles, and an iron rope.

432-33. The *kavacha* or armour is the protection for the upper limb, has the helmet for covering the head, is made of iron sheet about the thickness of wheat.

434. The *karaja* is a strong arm that is made of iron and has a keen edge.

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[1] कान्तरजस: dusts or filings or powders of iron. समन्यूनाधिक: according as the parts of the constituents are equal to, less or greater than, (the fixed proportion).

[2] The चक्र is whirled from the नाभि or centre.

435-37. The king who is provided with good supplies, is endowed with the 'six attributes' of Statecraft, and equipped with sufficient arms and ammunitions, should desire to fight. Otherwise he gets misery and dethroned from the kingdom.

[1]438-39. The affair that two parties, who have inimical relations with each other, undertake by means of arms to satisfy their rival interests is known as warfare.

440-41. The *daivika* warfare is that in which charms are used, the *âsura* that in which the mechanical instruments are used, the human warfare that in which *sastras* and *hands* are used.

442-3. There may be a fight of one with many, of many with many, of one with one, or of two with two.

444-45. The ruler who wants to fight should carefully consider the season, the region, the enemy's strength, one's own strength, the four-fold policy and the six attributes of Statecraft.

446-48. The autumn, *hemanta* (October and November) and winter are the best seasons for warfare. The spring is good, the worst is the summer. In the rainy reason war is not at all appreciated, peace is desirable then.

[2]449-50. When the king is well provided with military requirements and master of a sufficiently strong army, the season is soul-inspiring and foreboder of good.

[3]451. If very urgent business arise the season is not auspicious.

452. One should place the Lord of the universe in the heart (when going out on an expedition).

[4]453. There are no rules about time or season in cases created by the killing of cows, women and Brahmans.

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[1] युद्ध War defined. The conditions of warfare are the following—(1) two parties inimical to each other, (2) furtherance of some ends, (3) use of arms.

[2] The idea is that no consideration of time need detain the man who is sure of his position and strength as regards troops and supplies.

[3] Even if otherwise the time be good for war, *i.e.*, if the seasons and weather be favourable, the ruler should not necessarily be tempted to undertake war. He should first look to more important and pressing business at home. Thus in ll. 449-51 Sukrâchâryya is advocating the theory that the man is the maker of his time, he should study his own conveniences and never be swayed by purely physical considerations of seasons, weather, climate, &c.

[4] Here, again, the physical considerations of time and season do not hold good.

[1]454-55. That country is excellent in which there are facilities for the regular parade and exercises of one's own soldiers at the proper time but there are none for those of the foe.

456-57. That country is said to be good which provides equal facilities for military exercises to the troops of both parties in a contest.

[2]458-59. That region is the worst is which the enemy's troops get ample grounds for parade and exercise but ones' own troops get none.

460-61. If the enemy's army be onethird less than one's own troops or untrained, inefficient and raw recruits, the circumstances would lead to success.

[3]462-63. One's own army that has been maintained as children, and rewarded by gifts and honours and is well supplied with war provisions does lead to victory.

[4]464-65. The six attributes of statecraft are known to be peace, war, expedition, taking cover or besieging, refuge, and duplicity.

466-67. Those actions by which the powerful foe becomes friendly constitute *sandhi* or treaty. That should be carefully studied.

468-69. That is said to be *vigraha* or war by which the enemy is oppressed and subjugated. The king should study this with his councillors.

470. A *Yâna* is expedition for the furtherance of one's own objects and destruction of the enemy's interests.

[5]471. An *âsana* is said to be that from which oneself can be protected and the enemy is destroyed.

472. The *âsraya* or refuge is said to be that by which even the weak becomes powerful.

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[1] Having described the proper time for warfare Sukrâchâryya is dwelling upon the battle-fields or zones of military operations. In doing so he is remarking upon the physical advantages and disadvantages of various regions from the military standpoint. That field is certainly the best which while giving oneself every possible vantage ground deprives the enemy of the same.

[2] Having described the काल and देश to be considered by a ruler before commencing military operations, Sukrâchâryya is in the following lines giving an account of the points to be noted in measuring the strength of the army or सेनाबल

[3] In ll. 464-65 Sukrâchâryya is describing the षड्गुण or six attributes of Statecraft that have to be considered before beginning an expedition.

[4] Each of these terms is being explained below.

[5] आसन something like 'lying in ambush' or 'taking cover,' or perhaps besieging as described in 570–711 &c.

[1]473. *The dvaidheebhâva is the stationing of one's troops in several regiments.*

[2]474-75. When the king has been attacked by a powerful enemy and is unable to counteract him by any means, he should desire peace in a dilatory manner.

[3]476-77. There is only one treaty or peace desired by people, that is gifts. Everything else besides alliance is a species of gifts.

478-79. The aggressor never returns without receiving something because of his might, for without gifts there is no other form of peace.

480. Gifts should be given according to the strength of the adversary. Service should even be accepted, or the daughter, wealth and property may be given away.

481. In order to conquer enemies peace should be made even with one's own feudatories.

482-83. Peace should be made even with the *anâryas* for (otherwise) they can overpower the ruler by attack.

[4]481. Just as a cluster of bamboos cannot be destroyed if surrounded by thick thorny trees, so the ruler should be like a bamboo surrounded by clusters.

[5]486-87. Peace should be made with the very powerful, war with the equal and expedition (aggression) against the weak; but to friends should be granted refuge as well as residence in forts.

488-89. The wise should make peace with the powerful if there be danger, and protect oneself at the proper time if the foes be many.

[6]490-91. There is no precedent or rule that war should be undertaken with a powerful enemy. The cloud never moves against the current of the wind.

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[1] Perhaps the object of this division into groups is to show the enemy that the army is not very powerful in number.

[2] In ll. 474-95 we have what may be called the Law of Nations regarding Peace in modern European treatises on International Law.

[3] Every treaty takes one or other form of transfer of property or valuables.

[4] The feudatory chiefs and अनार्य or barbarian races, forest tribes, &c., are here compared with the thorns surrounding a big tree which make access to it difficult. Sukrâchâryya is advocating the expediency of converting these into friends. The wise ruler should make good use of these forces by concessions, grants and rewards &c. So that in times of emergency these may stand him in good stead by making the enemy's progress impossible. What are generally ignored as insignificant or worthless should be regarded by the statesmen as important sources of the State's strength.

[5] *Cf.* 1. 580 where two clases o आश्रय are mentioned.

[6] It is never safe to measure strength with a giant.

492. Prosperity never deserts a man who bows down to the powerful at the proper time, just as rivers never leave the downward course.

[1]494-95. The king should never trust the enemy even after concluding peace. Thus Indra killed Vritra in days of yore during the truce time.

[2]496-97. One should commence warfare when one is attacked and oppressed by some body, or even only when one desires prosperity, provided one is well placed as regards time, region and army.

498-500. The king should surround and coerce the ruler whose army and friends have been lessened, who is in the fortress, who has come upon him as enemy, who is very much addicted to sense-pleasures, who is the plunderer of people's goods, and whose ministers and troops have been disaffected.

501. That is known to be *vigraha*, any other thing is *kalaha* or mere quarrel.

502-503. One with a small army should never undertake a *vigraha* or engage in war with a valorous man backed by a powerful army. If, however, that be done, his destruction is inevitable.

[3]504. The cause of *kalaha* or quarrel or contention is the exclusive demand (of rivals) for the same thing.

505. When there is no other remedy *vigraha* or war should be undertaken.

[4]506-507. *Yânas* or expeditions are known by experts to be of five kinds—*Vigrihya*, *Sandhâya*, *Sambhuya*, *Prasanga*, and *Upekshyâ*.

508-509. The *Vigrihya* expedition is known by masters proficient in the subject to be that in which the army proceeds by gradually overpowering groups of enemies.

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[1] अद्रोह temporary cessation of hostilities, armistice or truce, during which all military operations should cease.

Sukrâchâryya is not a believer in the words of treaties. He rather advises rulers to follow the maxim that truces are to be kept only so long as it is convenient. or 'exppedient.' He quotes instances from *Puurânik* history where even the greatest personalities did not scruple to violate solemn pledges in order to serve their interests.

[2] There are no fixed occasions for warfare. These are to be sought or created by the ambitious ruler. He is to catch time by the forelock and always be ready for aggression or defence as need be.

[3] When both parties display extraordinary earnestness for attaining the same object there is a strife inevitable.

[4] Each of these technical terms is being explained below.

[1]510-11. Or *Vigrihya* expedition is that in which one's own friends fight with the adversary's friends on all sides, and the main army proceeds against the enemy.

[2]512-13. The *Sandhâya* expedition of the man desiring victory is that which proceeds after peace is made with certain supporters of the enemy.

514-15. The *Sambhuya* expedition is that which proceeds under the king aided by feudatories skilled in warfare well equipped with physical and moral resources.

[3]516-17. The *Prasanga* expedition is that which begins against a certain objective but incidentally proceeds against another.

518-19. The *Upekshya* expedition is that which neglects the enemy and retreats after encountering adverse fate.

520. If the king (is generous and) rewards (well), the army becomes attached to him though his conduct is unrighteous and he comes of a low family.

521-22. The ruler should pacify his own troops by gifts of rewards and should go ahead accompanied by heroic guards.

[4]523. In the centre should be placed the family, treasure and valuables.

524. He should always carefully protect his army.

525-26. The commander should march in well-arrayed regiments wherever difficulties arise on the way through rivers, hills, forests and forts.

527-28. If there be danger ahead the commander should march in the great *makara* or crocodile array, or the *shyena* or bird array which has two wings or the *shuchi* (needle)-array which has a sharp mouth.

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[1] Two kinds of *Vigrihya Yâna* are described :—

(1) When the expedition proceeds through a series of fights and skirmishes with enemies on the way.

(2) When one's own allies are induced to fight with the enemy's allies, and the party proceeds against the enemy. In this case no party can have recourse to allies in the principal contest,

[2] पार्ष्णिग्राह those who take the back, *i.e*, supporters. These supporters are therefore the enemy's allies.

[3] There is a sleight in warfare. If instead of attacking the professed or ostensible object the party marches against another, there is a case of *Prasanga Yâna.*

[4] फल्गु great, precious.

[1]529-31. If there be danger behind, the *shakata* (carriage)-array, if on the sides the vajra (thunder) array, if on all sides the *sarvatobhadra* (octagonal) or *chakra* (wheel) or *vyâla* (snake) array. Or the array should be determined according to the nature of the region in such a way as to pierce the enemy's army.

[2]532-33. None besides one's own troops are to know the signs for the formation of battle-'orders' communicated by means of bugle sounds.

534-35. The wise should always devise diverse forms of battle array for horses, elephants and footsoldiers.

536-37. The king should order the soldiers aloud by signs of battle-order from a station on the right or left, in the centre or in the front.

538. Having heard those orders the troops are to carry out the instructions.

539-40. Grouping, expansion, circling, contraction, straight movement, rapid march, backward movement,

541-43. Forward movement in rows, standing erect, lying down, standing like octagon, wheel, needle, carriage, half moon,

544-45. Separation in parts, standing in serial rows, holding the arms and weapons, fixing the aim, and striking the objective,

[3]546-47. Flinging of missiles, striking by weapons, swift use of arms,

548-49. Self-defence, counteraction by movements of limbs or use of arms and weapons, movements in rows of two, three or four,

[4]550. Movement forward or backward or sidewards.

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[1] व्यूह battle array, the form or order in which the troops are arranged or stationed in the battle-field. Eight species are enumerated here—classified according to the nature of the obstacle to be encountered, *e.g.*, dangers ahead, behind, on the sides or on all sides.

The Battle arrays :

I. Danger ahead :—(1) Crocodile.
(2) Bird.
(3) Needle.
II. Danger behind : (1) Vehicle.
III. Danger on the sides :—(1) Thunder.
IV. Danger on all sides :—(1) Octagonal.
(2) Wheel.
(3) Snake.

[2] *The technique of bugles is a military secret.*

[3] द्राक् rapid, instantaneous.

[4] Having enumerated the 8 *vyuhas* or Battle-orders in ll. 525-531, Sukrâchâryya has in ll. 539-550 enumerated about 30 different purposes for which these are formed.

551. *In throwing a missile, movement forward or backwards is necessary.*

552. The soldier stationed in the battle-array should always fling the missile by moving forward.

553. Just after throwing the arm the soldier should sit down or move forward.

554-55. Having seen the enemy in the sitting posture the troops should cast their own arms by moving forward in ones or twos or groups as ordered.

556-57. The *krauncha* (pigeon) array is to be formed according to the nature of the region and the troops in the same rows as the movements of pigeons in the sky.

[1]558. It is that order in which the neck is thin, the tail medium, and the wings thick.

559. The *shyena* or bird order is that in which the wings are large, the throat and tail medium, and the mouth small.

560. The *makara* or crocodile order is that which has four legs, long and thick mouth and two lips.

561. The *suchi* or needle order has a thin mouth, is a long rod and has a hole at the end.

562. The *chakra* array has one passage and has eight concentric rings.

563. The *sarvatobhadra* array is the battle order which has eight sides in all directions.

564. The wheel array has no passage, has eight concentric rings and faces in all directions.

[2]565. The carriage-array has the aspect of a vehicle, and the snake array that of a snake.

[3]566-67. The ruler should devise one, two or more of these *vyûhas* or a mixture of them according to the number of troops and the character of roads and battle-fields.

568-569. One should lie with troops at those places whence the enemy's army can be onerpowered by arms and weapons. The condition is called *âsana.*

[1] **The pigeon-array is the ninth form of battle-order.**

[2] **In ll. 556-565 the nine *vyûhas* have been described and explained.**

[3] **It is to be noted that the *vyûhas* have been described incidentally in connexion with expeditions, one of he षड्गुणs or six attributes of Statecraft.**

[1]570-571. From the manœuvre of *âsana* one should destroy carefully those people who help the enemy by carrying wood, water and provisions.

[2]572-573. One should subjugate the enemy through protracted processes by which provisions are cut short, food and fuel are diminished, and the subjects are oppressed.

574-575. When in a war both the enemy and the aggressor have got tired they seek cessation from hostilities. The state is called *sandhâya âsana* or truce.

576-577. When one has been overpowered by the enemy and does not find any remedy to counteract the defeat he should seek refuge with a powerful ruler who is truthful, honest, and has good family connexions.

[3]578. The friends, relatives and kinsfolk are the allies of the aggressors. Other rulers are either paid friends or sharers in the spoils of victory.

[4]580. That is said to be *âsraya*, as well as forts.

[5]581-3. When the ruler is not sure of the methods of work to be adopted, and is waiting for the opportune time, he should have resort to duplicity like the crow's eye and display one move but really adopt another.

584-587. Even ordinary people get their desired objects through good methods, good policies, and persevering efforts, cannot the princes? A work can be successful only through efforts, not through mere wish. Thus the elephant does not of itself enter the mouth of the sleeping lion.

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[1] *Âsana* thus seems to be equivalent to laying siege to a town. The aggressor is to take such a stand that from his place he can reconnoitre the grounds round about (परित:, आसात्), prevent the entrance of allies or reinforcements with provisions, and also pour down arms and missiles upon the enemy besieged. That आसन is a siege would be clear from the following lines.

[2] The processes described are those of a regular and obstinate siege which compels the defendants to submit on any terms.

[3] Two classes of allies—those (1) who volunteer their services, and (2) who have to be paid or promised booty. One may seek shelter with both these classes.

[4] Refuge or shelter (*âsraya*) is thus of two kinds—(1) human, as described above, (2) physical forts.

[5] काकाक्षि The crow has only one pupil, but it moves through both eyes. So the same man is to follow both purposes at the same time, this, however, unnoticed अलक्षित as the crow's pupil.

Lines 568-83 contain suggestions about the time when each of the six principles of policy have to be adopted, *e.g.*, truce, siege, etc.

[1]588-90. *Even the hard iron can by proper methods be converted* into a liquid. It is also a noted fact that water extinguishes fire. By the man who exerts, fire can be extinguished.

591. It is policy by which the feet can be placed on the head of elephants.

[2]592. Separation is the best of all methods or policies of work, and *samâsraya* or refuge is the best of the six attributes of Statecraft. Both these are to be adopted by the aggressor who wants success. Without these two the king should never commence military operations.

[3]595-6. He should adopt such means as lead to rivalry or conflict between the Commander-in-chief and Councillors of the enemy, and strife among their subjects or women.

[4]597-98 One should always study the policies as well as six attributes of Statecraft concerning both parties, and embark upon a war if death or universal plunder have been the antecedent circumstances.

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[1] The instance of the liquefaction of iron is suggestive of some metallurgical operation prevalent in ancient times.

[2] The king should be strong is his use of भेदनीति or the Policy of Separation or Partition by which the enemy may be weakened or dismembered, and he should be strong in his allies or friends with whom he can take refuge in emergency. Note the distinction between the four *upâyas* or policies and *shadgunyas* or the six attributes.

[3] This is the *Bheda upâya* or Policy of Partition. It should always be the policy to foment civil dissensions among the enemy, *e.g.* by promoting rivalry between the Civil and Military heads. *Cf.* Louis XIV's policy towards the Stuart Kings of England.

[4] The six attributes of Statecraft are :—

1. Peace—सन्धि
2. War—विग्रह
3. Expedition—(i) विगृह्य
   (ii) सन्धाय
   (iii) सम्भूय
   (iv) प्रसङ्ग
   (v) उपेक्ष्य
4. Taking cover or Besieging आसन
5. Refuge समाश्रय
6. Duplicity द्वैधीभाव

Sukrâchâryya has in ll. 464-598 narrated in brief what is considered to be the Law of Belligerents. The Law of Nations regarding Friends, Foes, Neutrals, Expeditions, Treaties, Truces, Battles, Capitulations as described here is sufficiently elaborate and practical. The discription of Battle-arrays in connection with that of Expeditions as well as the purposes to which each is adapted indicates perfect mastery over the art of field-marshalling and military manœuvres. The whole of this Section of *Sukraniti* in fact corresponds to those chapters of modern Text-books on International Law which deal with War generally, especially war on land, and discuss such questions as the characteristics of war, causes, kinds and ends of war, armed forces of belligerents, regions of war, &c.

599. Even Brahmanas should fight if there have been aggressions on women and priests or there has been killing of cows.

600. One should not desist from the fight if it has once commenced.

601. The man who runs away from battle is surely killed by the gods.

602-3. The king who protects subjects should in pursuance of the Kshatriya's duties never desist from a fight if called to it by an equal, superior or inferior.

[1]604-5. The earth swallows the king who does not fight and the Brahman who does not go abroad, just as the snake swallows the animals living in the holes.

[2]606-7. The life of even the Brahman who fights when attacked is praised in this world, for the virtue of a Kshatriya is derived also from Brahma.

[3]608. The death of Kshatriyas in the bed is a sin.

[4]609-10. The man who gets death with an unhurt body by excreting cough and biles and crying aloud is not a Kshatriya. Men learned in ancient history do not praise such a state of things.

612. Death in the home except in a fight is not laudable.

[5]613. Cowardice is a very miserable sin in valorous people.

[6]614-15. The Kshatriya who retreats with a bleeding body after sustaining defeat in battles and is encircled by family members deserves death.

616-17. Kings who valorously fight and kill each other in battles are sure to attain heaven.

618-19. He also gets eternal bliss who fights for his master at the head of the army and does not shrink through fear.

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[1] These are contemptible creatures who deserve destruction. The cowardly king and the untravelled Brahman are not worth their names and have no reason to live on earth.

[2] So fighting is also prescribed among the duties of Brahmans.

[3] The very connotation of the term Kshatriya, says Sukra, is to die anywhere else except in the home bed : just as that of the Brahman is to travel abroad begging alms and spreading knowledge &c.

[4] The proper death for a Kshatriya is that on the battle-field in open warfare. The most disgraceful for him is that through disease and physical ailments. He should by all means avoid the natural death that removes ordinary people from the surface of the earth.

[5] Warriors should always live valorous, should die valorous deaths, *e. g.*, in battles. Even the last moments of their lives should be spent valorously.

[6] This dictum of Sukrâchâryya would certainly appear to be a chip from Spartan and Bushido morality. The rules of militaryism or Kshatriyaism are the same in all lands and climes. The deserter and the failed warrior have no place in society and family circle.

620-21. People should not regret the death of the brave man who is *killed in* battles. The man is purged and delivered of all sins and attains heaven.

[1]622-23. The fairies of the other world vie with each other in reaching the warrior who is killed in battles in the hope that he be their husband.

[2]624-25. The great position that is attained by the sages after long and tedious penances is immediately reached by warriors who meet death in warfare.

[3]626-7. This is at once penance, virtue and eternal religion. The man who does not fly from a battle does at once perform the duties of all the four *âsramas.*

628-29. There is no other thing besides valour in all the three worlds. It is the valorous man who protects the universe, it is in him that eveything finds its stay.

630-31. The immovables are the food of the mobiles, the toothless of the toothed creatures, the armless of the armed, the cowards of the valiant.

[4]632-33. In this world two men can go beyond the solar sphere (*i.e.*, into heaven):—the austere missionary, and the man who is killed in the front in a fight.

634-35. One should protect oneself by killing even the learned Brahman and Guru in battle if they are inimical. This is the decree of *Śruti* or Vedas.

[5]636-37. The teachers are kind and the learned people are advocates of sinlessness. They should never be asked on occasions of great fear (*e.g.*, warfare).

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[1] The *sanction* for the warrior's duties in life: (1) eternal bliss in heaven and enjoyment of all that it implies, (2) otherwise, perpetual ignominy and disgrace on earth.

[2] Here is a further temption for death in war.

[3] The high and exalted position of Rishis, acquired by meditation and penance, as well as the virtues of ideal householders who perform through life all the elaborate duties of the four stages of human existence, *viz.*, *Brahmacharyya*, *Gârhasthya*, *Vânaprastha* and *Sannyâsa*, are forthwith enjoyed by the warrior who bravely welcomes death in the battle-field. This single action is equivalent to any or all the possible duties to be performed by a man whether as *Rishi*, *Sannyâsi*, *Brahmachari*, or *Grihastha*.

[4] Two extraordinary men who deserve transcendental happiness are (1) the itinerant preacher who has got a vision of the eternal truths of the universe through processes of self-control and meditation on the Permanent Verities, and (2) the heroic warrior who meets death in the face (not on the back), *i.e.*, who has not to retreat like a coward but can coolly encounter the worst calamity.

[5] The advice of such people as are timid by nature and occupation should never be sought in matters that involve bloodshed &c.,

[1]638-39. Learned people are ornaments in places where they can discourse on diverse subjects, *e.g.*, in palaces, assemblies and cloisters.

[2]640-41. Learned people are ornaments in those places where they can perform various intellectual feats before large audiences in the matter of Sacrifice, Military Science, &c.,

[3]642-45. Learned people are ornaments also in the matter of finding out others' defects, studying human interests, and managing elephants, horses, chariots, asses, camels, goats and sheep, in the matters connected with cattle, wealth, roads, and *Swayamvara*, and in studying the defects of food and social practices.

646-48. One should disregard the "wise men" who extol the merits of the enemies, discover the purposes the adversary has in view, and without minding that destruction might befall the army (in case of war) should employ a (suitable) expedient that would destroy the enemy.

649-50. The Brahmana who appears with a murderous intent is as good as a Śudra. There can be no sin in killing one who comes with a murderous intent.

[4]651-52. One would not incur the sin of killing an embryonic child (*i.e.*, an infant) if one kills even an infant who has come upon him with weapon in hand. It is otherwise that one really perpetrates that offence.

653-55. The sin of killing a Brahman does not touch the man who treats like a Kshatriya and kills the Brahman that fights with arm in hand and does not leave the battle-field.

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[1] They should grace those council-halls and discussion rooms, but must not interfere in executive affairs.

[2] Their proper function is study, discussion, talk, giving decision on subtle questions, solution of knotty problems of social or religious life etc. Let them preside there.

[3] All those affairs that require the knowledge of people trained in the sciences and arts should be left to the learned people for deliberation and advice. They are theorists and naturally have no place where the practical use of arms and limbs is concerned.

[4] These lines describe what in terms of modern International Law would be called *Enemy Character.* Any and every enemy is to be killed, even the Brahmana and the भ्रूण (embryonic child) or infant. Ordinary rules of Hindu *Sāstra* enjoin great purificatory penances on the man who kills a Brahmana or a भ्रूण But Sukrâchâryya's System of Military Morality keeps those rules in abeyance. These persons are to be treated as no better than ordinary enemies, the very moment they assume enemy character.

[5] The Brahman is no longer a Brahman, but in the first place a Kshatriya, and in the second place, has all the attributes of an enemy. The ordinary treatment of a belligerent is therefore to be meted out towards him.

656-57. The rascal who flies from a fight to save his life is really dead though alive, and endures the sins of the whole people.

658-59. The man who deserts the ally or the master and flies from the battle-field gets hell after death, and while alive is cried down upon by the entire people.

660-61. The man who sees his friend in distress and does not help him gets disrepute, and when dead goes to hell.

662-63. The wicked man who deserts one that seeks refuge with him in confidence goes to eternal hell so long as there are the fourteen Indras.

[1]664-65. The Brahmans should kill the Kshatriya when his practices are wicked. They do not incur sin even if they fight with arms and weapons in hand.

666-67. When, again the Kshatriyas have become effete, and the people are being oppressed by lower orders of men the Brahmanas should fight and extirpate them.

668-69. The war with charmed instruments is the best, that with mechanical is good, that with weapons inferior, that with hands is the worst.

670-71. That war with charmed instruments is known to be the best of all in which the foes are destroyed by arrows and other arms rendered powerful through being applied with charms.

672-73. The war with mechanical instruments leads to great destruction of the enemy in which balls are flung at the objective by the application of gunpowder in cylindrical fire-arms.

674-75. The war with weapons is that generally undertaken in the absence of fire-arms and other missiles, in which foes have to be killed by the use of *Kunta* swords and other weapons.

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[1] **Sukrâchâryya, here again as usual, is not an advocate of absolute morality, but always prescribes duties that, though apparently conflicting or contradictory, are really called for by the needs of human life and social existence. Not Consistency but Truth is his great motto, and to him the greatest truth is the promotion of human well-being and social welfare. And as the interests of mankind are ever changing, and complexities are perpetually disturbing social order, Sukra does not scruple to be inconsistent and dictate duties at times which might appear grossly at variance with those prescribed on other occasions. Thus the Brahman who is ordinarily to abstain from the military profession, is in duty bound to accept that as the only call of religion and morality under grave circumstances. A society that is governed by such practical rules as these cannot but move and progress with the times and not only adapt itself to the varied requirements of the ages but also use the environment and world forces for its own purposes, in the interest of its own growth and development.**

[1]676-77. The war with hands, *i. e.*, duel or hand-to-hand fight is that in which the adversary is overpowered by strong grasps and skilful attacks on the joints of limbs, &c., whether against or in line with the system of hair.

[2]678-82. Catching the hair by means of the left hand, throwing down on the earth by force, beating by the leg, *i.e.*, kicking on the head, pressing at the breast by knees, severe beating on the brow by bael-like (heavy) fists, elbowing, constant slappings, and moving about to find out the proper places of attack—these eight are the species of duelling.

[3]683-84. The Ksatriya should be attacked by four of these species, the worst Kshatriya by five, the Vaiśya by six, the Śûdra by seven, and the mixed castes by all the eight.

[4]685. These methods have to be applied to the enemies, never to the friends.

686-88. One should commence fight with any enemy whose ministers and army have got disaffected by placing the fire-arms both light and heavy in the front, the infantry just behind them, the elephants and horses in the wings.

689-91. The first skirmish is to be commenced by commanders with half the army in the front and the wings so long as the region favourable for warfare is not acquired.

[5]692-93. The war should then be undertaken by ministers with troops conducted by ministers, then finally by the king at the risk of his own life with troops commanded by the king.

[6]694-700. One should carefully protect one's troops but extirpate the enemy's, when they have got tired by long marches, or through

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[1] प्रतिलोम (motion) in the contrary direction and अनुलोम (motion) in the natural direction. The joints and other parts of the body have to be pulled in the contrary or natural directions (of movement or locomotion) as convenient, and bound or grasped powerfully; So that the adversary may be quite motionless.

[2] कच Hair must have been long. The custom of lopping off the hair was not prevalent, it appears. मालूर Bael fruit.

[3] Laws of duelling. But it is not clear why only four or five of these 8 forms of hand-to-hand fight have to be applied in fighting some of the castes &c.

[4] Of course none of these engines of warfare, whether duels or other 3 kinds, are meant for friends or allies. The line is quite irrelevant.

[5] The main brunt to be borne (1) by the commander (2) by the councillor, (3) by the king in succession.

[6] When such natural calamities or unfavourable circumstances befall the enemy's troops, it is the opportune moment to commence operations against them. But if one's own army gets into this plight it would be most undiplomatic to leave it in that condition. Their anxieties must be removed and difficulties remedied.

hunger and thirst, when they are oppressed by disease, famine, hailstorms and thieves, when they have to suffer from impurities of mud and dirt in water, when they are gasping for breath, when they are asleep or engaged in taking food, when they are not in contact with the ground (*i.e.* have mounted tree, etc., etc.), when they are vacillating, when they are overpowered by fear of fire or attacked by wind and rain, and by such other dangers and difficulties.

701-2. Of all the dangers that are known by the wise to befall an army, the worst is *Bheda* (alienation or separation, or estrangement).

703-4. Even the *Maula* or standing or old army, if disaffected, is a source of dubious strength to the king. What to speak of the sundry recruits under disaffection ?

705. One should always study the fourfold policy, the sixfold attributes of statecraft and the secrets of oneself as well as the enemy.

706. The enemy has to be killed in wars whether conducted according to the rules of morality or against them.

707-11. The king should increase the salary of the officers about a quarter in beginning the expedition, cover his own body during the fight by means of shield and panoply, make the soldiers drink invigorating wines, and employ in the battle those heroes who are enthusiastic and are certain of the issue and extirpate the foes by fire-arms, daggers and troops.

712-15. The horseman has to be attacked by the Kunta sword, the charioteer and the man on the elephant by arrow, the elephant by the elephant, the horse by the horse, the chariot by the chariot, the infantry by the infantry, one by one, the weapon by the weapon, the missile by the missile.

[1]716-21. One who follows the duties of good people should not kill the man who is on the ground, who is deformed, who has his hands arranged in the form of *anjali* (*i.e.* in the sign of humiliation), who is seated with hair dishevelled, and who says 'I am yours,' who is asleep, who is naked or unarmed, whe is seeing others fight or is fighting with others, who is drinking water, taking food or busy with other matters, who is terrified, who retreats.

722. The old man, the infant, the woman, as well as the king, when alone, are not to be killed.

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[1] Sukrâchâryya's Laws of Military Morality mention the persons who are not to be killed. The various signs of impotency or humiliation are described.

Dishevelled hair is a sign of defeat and failure. It appears here again that the hair was not lopped off in those days.

[1]723. But there is no deviation from the path of morality if one kills others by applying the prescribed methods.

724. These rules, however, apply only to warfares conducted according to the dictates of morality but not otherwise.

725. There is no warfare which extirpates the powerful enemy so much as the *kutayudha* or war conducted against the dictates of morality.

[2]726-27. In days of yore the *kuta* warfare was appreciated by Râma, Krishna, Indra and other gods. It was through *kuta* that Vâli, Yavana, and Namuchi were killed.

[3]728-30. One should inspire confidence in the enemy by sweet smiling face, soft words, confession of guilt, service, gifts, humiliation, praise, good offices as well as oaths.

731. One should study the enemy's defects with a mind sharp as the razor.

[4]732-33. The wise should place insult or humiliation in the front and honour or glory at the back in order to fulfil his desired object. It is folly to lose one's object. •

734-36. The king seated on a platform, should study the activities of troops. Those who are friends of the king and the State, and who understand the bugle's sounds and signs of Battle-orders should always supervise the parades and exercises of troops.

737. Having noticed that disaffection has spread among the army through the enemy, the king should remove that.

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[1] The prescribed methods would be those rules about duels, &c., and about persons who are not to be killed, &c.

[2] Râma killed Vâli, Krishna Yavana, and Indra Namuchi. Who is this Yavana?

[3] These are some of the means by which *kuta* or deceit may be performed, and the enemy overpowered unawares. Sukrâchâryya does not recommend the ordinary rules of morality and religion to be followed in military affairs. He is an advocate of expediency and diplomacy, *i.e.*, of the theory of trying to do the best under the circumstances, and to always adapt oneself to the varying conditions of the world. So in extirpating the enemy none can trust to only one method of procedure, but has to adopt diverse methods according to the changes in the enemy's character or in the political situation generally. Nobody should have faith in treaties or promises of the foe but always be prepared for brow-beating him. This is to a ruler the sole religion, the sole truth, any other thing would be irreligion, untruth. Hence according to *Sukraniti* so-called irreligion, immorality, inconsistency, and untruth which are the characteristics of *kutayuddha* should not at all deter the king from a course of action that would lead to the desired object.

[4] The wise man should be indifferent to fame and name, and never think of glory and honour in achieving his ends. It should be his policy rather to suffer or welcome or invite insult and ignominy for sometime in order that he may triumph in the end.

[1]738-39. The king should grant rewards of wealth, property or privileges to those troops by whom new deeds are performed in the order of their deserts.

740-41. The powerful should carefully coerce the enemy by stopping the supplies of water, provisions, fooder, grass etc. in an unfavourable region and then extirpate it.

[2]742-45. One should sedulously destroy the enemy's troops by alienating them by gifts of counterfeit gold, and also by alluring them to sleep through acts of confidence after fatigue due to keeping up of nights, but not the army of their allies even though they are under the sway of vices.

746. One should never allow a territory very near one's own to be made over to another.

[3]747-88. One should commence military operations all on a sudden and withdraw also in an instant and fall upon the enemy like robbers from a distance.

[4]749-50. Silver, gold or other booty belong to him who wins it. The ruler should satisfy the troops by giving them those things with pleasure according to the labour undergone.

751-52. Having thus conquered the enemy, the king should realise revenue from a portion of the territory or from the whole, and then gratify the subjects.

753-54. The king should enter the conquered city with the auspicious sound of the *turyya* and protect like children the people thus won over and made one's own.

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[1] If the troops get alienated through enemy's sleights they have to be coerced, but if they perform unexpected feats from which advantages accrue to the master they should be duly rewarded.

[2] कूटस्वर्ण counterfeit gold *i.e.* coins. The rewards by which the enemy's troops are to be made favourable are however not genuine.

नित्यविश्रम्भसंसुप्तं asleep through constant acts of faithfulness. The mutual relations are to be made so cordial and friendly that the enemy have perfect confidence in the good faith of the other.

The wisdom of not destroying the army of the enemy's allies is not self-evident.

[3] The time and character of the aggression are to be quite unexpected. The army must be adroitly manœuvred in such a way as to take efficient stand in any capacity. Agility, elasticity and flexibility are the qualities of generalship that would be required for these purposes of quick move and quick change of front.

[4] In ll. 728-50, Sukrâchâryya has described all the methods that may be adopted for extirpating the enemy.

[1]755-56. The King should appoint councillors to the study of statecraft according as it varies with time, place and circumstances and also as it is the beginning, middle or end, in order that they may find out the values of various policies and the methods of work.

[2]758-59. The officers of councillors are to explain the business to the Crown Prince. The Crown Prince is then to communicate the findings to the king in the presence of the councillors.

[3]760-61. The king is first to direct the Crown-Prince. Then he is to direct the ministers, they the officers.

762. The priest is to counsel the king about good and evil courses of action.

[4]763-64. The king should station the troops near the village but outside it. And there should be no relations of debtor and creditor between the village folk and the soldiery.

765. The goods that are meant for the army should be reserved for soldiers in their midst.

766. The troops must never be stationed at any one place for a year.

767. The king should manage the army in such a way that about a thousand can be ready for service in an instant.

768. The military regulations should be communicated to the soldiers every eighth day.

769-71. The troops should always forsake violence, rivalry, procrastination over State duties, indifference to injuries of the king, conversion, as well as friendship with the enemies.

772. They should never enter the village without a royal 'permit.'

773-74. They should never point to the defects of their commanders, but should always live on friendly terms with the whole staff.

[5]775. They should keep the arms, weapons and uniforms quite bright (and ready for use).

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[1] The policy must vary of course according as the measure is in the initial stages or in process of fulfilment or about to be completed.

[2] Thus in the first instance a problem is to be studied by ministers. The Crown Prince is next to know the results from them. The king is to be informed at last. This is the procedure of deliberation.

[3] The executive functions are discharged in the order described in these lines.

[4] The lay people and the military men must always be kept at a respectful distance from each other both physically and socially. There must also be no 'credit'-transactions between them.

[5] Rules about tidiness and careful handling of arms and uniforms are among the items of military discipline.

[1]776. Food, water, a vessel measuring one prastha, and vessel in which food for many might be cooked.

777-78. "I shall kill the troops who will act otherwise. You should all show me the booty that you receive from the enemy."

779-80. The king should always practise military parades with the troops, and strike the objective by means of missiles at the stated hours.

781-82. The king should count the troops both in the morning and evening and study their caste, stature, age, country, village and residence.

783-85. The king should have recorded the period served, rate of wages and the amount paid, how much has been paid to servants by way of wages and and how much by way of rewards. He should receive the acknowledgments of their receipts and give them the forms specifying wages etc.

786-87. Full pay is to be granted to those who are trained soldiers. Half pay is to be given to those who are under military training.

788. One should extirpate the troops that have illicit connexions with evil-doers and enemies.

789-90. The king should find out those soldiers who are addicted to the king's vices, enemies of virtues and are indifferent to the vices.

791. The king should always forsake the servants, who, though qualified, are pleasure-seekers.

[2]792-94. In the inner appartments such men are to be appointed as are

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[1] Perhaps the food stores are meant. The troops are to be responsible not only for their personal arms and uniforms but also for their own provisions.

[2] There are three terms used in these three lines indicating three grades of confidence. One is the recommendation for service in the Zenana, the second for service in the Accounts or Treasury Department and the third for appointment as an ordinary officer Trustworthiness is required everywhere but there are grades which make difference between trustworthy and trustworthy people.

The three terms are स्वान्त विश्वस्त, लोकविश्वस्त, and स्वान्त लोकविश्वस्त which is a compound of the two. This last is the qualification for service in the inner apartments.

But what does it mean? Perhaps, the man who is trusted by both लोक or people generally as well as because of his स्वान्त (or inward character ?) is fit to be employed in the Zenana.

The man of the next grade of confidence is he whose inward character स्वान्त is proof against cupidity and other vices. He would be the proper servant in the Treasury. As for ordinary functions of State officers people who are generally trusted by the public (लोक विश्वस्त) would make capital functionaries.

In the case of the Zenana officers both the qualifications are necessary because perhaps of the public reputation that is always the great asset of the Royal household. It would therefore not be enough to appoint men whose *character* is proof against the temptations. They must also be known to the *public* to be men of high stirling virtues. But in the case of the Treasury where the sole test of character is honesty and avoidance of embezzlement &c., Sukrâchâryya recommends men who have only one of these qualifications, *viz.*, the possession of a virtuous inner self.

very trustworthy. They are also to be appointed in the Spending Department. So also those who enjoy the confidence of the people are to be appointed for the external functions.

795. If appointed otherwise, they lead to compunction.

[1]796-98. Those alienated councillors of the enemies and such of their officers as are perpetually dishonoured through the master's vices, and are instrumental in serving one's purposes should be maintained by good remuneration.

199. Those who have been alienated through cupidity and inactivity should be maintained by half remuneration.

800. The king should maintain by good remuneration the well qualified men who have been deserted by the enemy.

801-802. When a territory has been acquired the king should grant maintenance beginning with the day of capture (to the conquered king) half of it to his son and a quarter to his wife.

[2]803-804. Or he should pay a quarter to the princes if well qualified, or a thirty-second part.

805. He should have the remaining portion of the income from the conquered territory for his own enjoyment.

806-807. He should invest that wealth or its half at interest until it is doubled, but not beyond that limit.

808-809. The king should maintain the dispossessed princes for the display of his own majesty by the bestowal of honours if well-behaved but punish them if wicked.

810-11. The king should divide the whole day (of twenty-four hours) into eight, ten or twelve periods of watch according to the number of the watchmen, not otherwise.

[3]812-813. At the beginning the watchmen are to serve during the several periods in a certain order. In the second round the first is to serve last, and the others to precede him.

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[1] **Sukrächâryya is always advocating the policy of keeping the enemy's troops, ministers and officers in one's pay—and subsidising them by secret-service-money.**

[2] **The construction here is a little intricate.**

[3] **It is difficult to make out the exact order in which the rounds of watchmen are to be governed. Suppose there are 4 watchmen A, B, C, D, and suppose the day is divided into eight periods 1, 2, 3, ...8. The order of rounds as suggested here would be :—**

1,	**2,**	**3,**	**4,**	**5,**	**6,**	**7,**	**8,**	**1,**	**2,**	**3,**	**4,**	**5,**	**6,**	**7......**
A,	**B,**	**C,**	**D,**	**D,**	**C,**	**B,**	**A**	**B,**	**C,**					

***But in this case the last man D would have to serve during two consecutive periods.* The arrangement does not seem to be perfect.**

[1]814-15. Or again, in the same manner, the last may be asked to be on duty in place of the first (in the above case) and then at the last watch (of that day), and then on the next day one who comes in the order of *the second* etc., *should finish* his turn first and so on.

816. The king should always appoint more than four watchmen for the day.

817. He may also appoint many simultaneously according to the weight of business.

818. He should never appoint less than four watchmen.

819-22. Whatever have to be protected or instructed should be communicated to the watchman. Everything should remain before him, and he should keep the measured amount of gold and other valuables in the wooden apartment (or trunk) and at the expiry of his term should show that to his successor.

823. At intervals the watchmen have to be called aloud from a distance.

824-25. It is only when the king follows the rules laid down by the wise that he is respected by the people, not otherwise.

826-27. That man deserves sovereignty for life whose activities are regulated, who is good and restrained in his receipts and who gives up illicit incomes.

[2]828-29. The man who is unrestrained in his speech and deed, and who is always crooked to friends is forthwith dragged down from his position.

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[1] Suppose there are four watchmen A, B, C, D, and the day (of 24 hours) is divided into 8 watches ; then they should be on duty :—

on the first day as—

1	2	3	4	5	6	7	8
D	C	B	A	A	B	C	D

on the second day as—

1	2	3	4	5	6	7	8
C	B	A	D	D	A	B	C

on the third day as—

1	2	3	4	5	6	7	8
B	A	D	C	C	D	A	B

and on the fourth day as,—

1	2	3	4	5	6	7	8
A	D	C	B	B	C	D	A

and on the fifth day the order will be the same as on the first day, and thus the order repeats itself. Similarly should it be understood when the day (of 24 hours) is divided into ten or twelve watches instead of eight.

[2] In these lines Sukrâchâryya is expatiating on the efficacy of following the नियमाः of the *Niti Śâstras.* Those who obey the rules are respected and those who do not follow them *i. e.,* are अनियमित in word, speech, realisation of revenues (ग्रहण) etc are not at all respected but soon meet with evil fate.

[1]830-31. Just as even the tiger and the elephant cannot govern the lion, the king of beasts, so all the councillors combined are incompetent to control the king who acts at his own sweet will.

[2]832-33. Those councillors are his servants and hence quite insignificant (in the matter of governing him). The elephant cannot be bound by thousands of bales of cotton.

834-35. It is only the powerful elephant that can extricate an elephant from the mud. So also it is only a king who can deliver a king who has gone astray.

[3]836-37. The dignity and force that are possessed by even the lower servants of powerful princes cannot be attained by even the ministers of kings who are insignificant.

[4]838-39. The unity of opinion possessed by the Many is more powerful than the king. The rope that is made by a combination of many threads is strong enough to drag the lion.

840-41. One whose territory is small, who is the servant of the enemy, should never maintain a large army, but should always augment the treasury for the prosperity of his own children.

[5]842-43. He should take to food and bed in such a way as to allay hunger and promote sleep, otherwise he shall grow poor.

844. The king should always spend money according to the manner indicated above, not otherwise.

845-46. Those kings who are devoid of morality and power should be punished like thieves by the king who is powerful and virtuous.

847-48. Even the lesser rulers can attain excellence if they are protectors of all religions. And even the greater rulers get degraded if they destroy morality.

849-50. It is the king who is the cause of the origin of good and evil in this world. He is the best of all men who attains sovereignty.

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[1] These lines continue the idea contained in the above lines about the अनियमित &c. स्वच्छन्दगामिन् equivalent to अनियमितकर्म्म one who does not abide by any moral precepts but follows his own whims.

[2] Of course men who are only paid officers cannot prevail over their master when he goes astray.

[3] It is the dignity of the ruler that contributes to the dignity of the officer. If the king himself be powerless, even his chiefest officers are looked down upon as quite insignificant.

[4] Unity is strength ; and the *many* is always more powerful than the *one*.

[5] One should eat and sleep only when there is real need for these. Undue eating and sleeping mean gluttony or luxury and idleness. Intemperance of any sort is ruinous.

[1]851-52. The science that was appreciated by the sages like *Manu* and others, had been incorporated by Bhârgava or Sukra in the form of twenty-two thousand Ślokas of *Nîtisâra.*

853-54. The king who always studies the abridged text of Sukra becomes competent to bear the burden of State affairs.

[2]855-56. In the three worlds there is no other *Nîti* like that one of the poet (Sukra). The poetical work (of Sukra) is the sole *Nîti* for politicians, others are worthless (as political codes).

857-58. Those rulers who do not follow Nîti are unfortunate and go to hell either through misery or through cupidity.

Here end the Seventh Section that on the Army in the Fourth Chapter of *Sûkranîti* as well as the Fourth Chapter.

---

[1] Sukra follows up the traditions of Manu. There is no mention of Kautilya or Châṇakya. It is a remarkable fact that *Sukraniti* closely resembles *Mamusamhitâ* in sentiment as well as language, whereas the *Arthasâstra* or the celebrated socio-political and socio-economic treatise of the Hindus does not seem to have left any significant trace on the work. This fact ought to be carefully borne in mind in fixing the date of *Sukraniti* in particular and the chronology of the *Nitiśâtras* in general.

[2] *Sûkraniti* is the genuine Nitiśastra or real science of morals, others are pseudo-sciences.

CHAPTER V.

SUPPLEMENTARY AND MISCELLANEOUS.

1-2. I shall now speak, in the Supplementary Chapter, of the remaining rules of morality laid down in the Śāstras that promote the welfare of the seven organs of the State as well as the people.

[1]3-4. One should study the defects and weaknesses of the enemy in the hope that 'I will overpower the enemy even at the expiry of a century.'

5-6. The enemy who is weak in councillors and army should fear the servants of the State. But one who is strong in ministers and troops should study the enemy's state by accepting service therein or by adopting the role of the trader.

[2]8-9. One should wait guardedly like the cat and the fowler and by creating confidence extirpate the enemy whose soul has been ruined by vices.

[3]10-11. The king should engage troops that can destroy the army of the opponents—not those who live in the enemy's territory, nor those who are secretly opposed to himself.

12. The king should never destroy one's own army by recklessly undertaking wars.

13. The officers should never desert the king even though deprived of gifts and honours.

14-15. One should never go over to the enemy's camp in order to protect one's person and property. Can the nourishment that is due to the rain-water from clouds be derived from the water of rivers &c. ?

[4]16. So also the promotion of the people's weal depends on the property of the king. Can this accrue from the wealth of the rich folk ?

---

[1] Once an enemy, always an enemy. The inimical relations must never be stopped. There may only be temporary cessation of hostilities which, however, is to be respected so long as favourable opportunities do not arise.

[2] No tricks are considered too mean if the object be to destroy the foes. The End justifies the means.

[3] प्रत्यनीक—opponent.

[4] Ordinary wealthy people are nothing compared with kings in the matter of promoting people's happiness,

[1]17-8. Even the most powerful should always display weakness, and having entered the enemy's state should be *instrumental in serving his interests, and when his roots have been well grounded,* should win over the whole territory.

20-1. He should uproot all the fundamental sources (of that State's strength) and convert to his side its enemies, co-sharers and generals by gifts of revenues.

22-3 Just as the branches &c., of a tree wither up when its roots decay, so also without the king, the commanders, &c., (grow powerless) immediately or in the course of some time.

[2]24-6. The king is the root of the State, the councillors are the trunks, the commanders are the branches. The troops are the leaves and flowers, the subjects are the fruits, and the lands are the seeds.

[3]27-8. The king should never trust the king whose confidence has been created, and should never meet him in his house or some lonely place accompanied by a few troops.

[4]29-30. The king should always keep beside him men who are very much like himself in dress, physique, form, &c., should at times be protected by special signs, and at times look like others.

[5]31-3. He should overpower the enemy by the aid of prostitutes, dancers, cf. Lovis XIV's policy towards stuart kings, wines, and songsters.

32-3. One should never go out for war with good clothes and ornaments, and kith and kin, or well-marked by special insignia.

---

[1] Just as it is the height of art to conceal art, so it is the height of strength to conceal strength. True statesmen never display their powers but always hide their influence and exercise it only when they are sure of their position. This is also the theory of diplomats whose policy is to be 'uncrowned' kings of peoples without formally declaring their position.

सञ्जातबद्धमूल Whose roots have grown inveterate, *i. e.*, who has been well placed in the affections of the people ; who enjoys unbounded confidence.

साधक instrumental (in carrying out the designs of the enemy).

[2] This fanciful analogy between a tree and the State is quite worthless.

[3] Trust and confidence are words that should not be found in the dictionary of diplomats, statesmen and kings.

[4] The king should be adept in the use of diverse uniforms and marks. The personality of the king requires to be carefully guarded, for this he is not to depend on the sentinels and troops only. But he must be resourceful enough to hide himself by various sleights of dress and appearance. Thus people should be about the king wearing dress almost like his own so that outsiders may not easily distinguish or single him out from the rest of the company. Again he should at times put on disguises to look like some other man (अन्यादृश). The art of dissimulation is an important branch of the king's education.

[5] Cf. Lovis XIV'S policy towards Stuart kings.

34. One should never for a moment be careless as regards servants, wife, children and enemies.

35-6. While one is living, full sovereignty should never be conferred upon the son, though he is naturally of a good character, for that is the source of great mischief.

36. Even Vishnu did not confer sovereignty upon his own son.

38. One should grant sovereignty to the son towards the close of one's life.

39-40. Princes are quite incompetent to maintain even for a moment the kingdom that has no king because of their vanity, fickleness and love of power.

41-42. The son after attaining the highest position should protect the subjects according to *Niti* and look upon the old councillors with respect like father.

43-44. They also are to adopt his courses of action when they are reasonable, but should prevent them by putting off, if otherwise.

45-46. They should never live with him against the dictates of *Niti* in the hope of amassing wealth. Those who thus live soon go to the dogs together with him.

47-48. The king who opposes the persons devoted to the interests of the dynasty and accepts new councillors is overpowered by the enemy and deprived of person and property.

49-50. But the new people are also to be maintained if they are qualified and virtuous, and should be placed in charge of duties together with the old ones.

[1]51-53. The king is served according to their interests by *Sadhus* who know how to delude my people or create tricks by means of humility, adoration, service, sweet and truthful speech, both direct as well as indirect.

[2]54. But the difference between them is in reality that between the sky and the earth.

55-56. The *dhurta* (cunning or crafty), the *jâra* (cheat) the thief and the learned men are all producers of artifices and tricks. But the learned man is not so expert as the cunning in this respect.

---

[1] **Sukrâchâryya is advising the king to be careful in dealing with men. For it is difficult to distinguish men who are really well-intentioned from men who are unfriendly. There are people who know how to look like ascetics and seem to be friends by their manner, speech and tactics. But they would serve you only so long as their purposes are to be fulfilled (यावत् कार्यं).**

[2] *The Sadhu adopts those winning arts only to seduce the king. They are not at all genuine.*

[1]57-58. The cheat and the thief are notorious for stealing people's property. These take secretly, but the cunning steals in one's presence.

59-60. The *dhurtas* or cunning people prove to the foolish people a good action to be bad, and a bad to be good, and thus serve their own purposes. They finally ruin people by creating their confidence through tricks and artifices.

62-63. One should always do good of those whom one intends to ruin. The fowler sings sweet in order to entice and kill the deer.

64 Without crafts and sleights no great work can be soon done by people.

65-66. No one can be wealthy without stealing others' wealth. That again according to one's desire is impossible without tricks.

67-68. Kings consider the robbing of others' wealth the greatest virtue and sacrifice their lives in great conflicts.

[2]69. If there accrue no sin to a king, robbers also should be absolved (from sin).

[3]70-72. Sins become virtues by a change of circumstances. That is virtue which is applauded by the many; that is vice which is cried down by all. The Theory of Morals is very intricate and cannot be understood by any body.

73. Excessive charity, penance and truthfulness lead to adversity in this world.

74. Words are valueless which do not lead either to virtue or to wealth (secular interests).

75-76. Whoever is able in matters either of wealth or of virtue, whoever knows the (nature of) time and place, whoever is free from doubts, such a man is to be respected, but he who always feels suspicious is not liked.

77-79. Man is the slave of wealth, not wealth of any body. So one should always carefully labour for wealth. Through wealth men get virtue, satisfaction and salvation.

---

[1] Thus the *dhurta* is cleverer than the cheat and the thief also.

[2] If killing, plundering, ravaging, &c., be allowed to kings why should not robbers be immune from sin due to the perpetration of the same offences? Cf. 'Alexander, too, a robber!'

[3] Sukrâchâryya is unable to explain why murder, bloodshed etc should be considered a virtue in kings and a vice in robbers by referring to the preconceived notions of morality and standards of right and wrong followed by ordinary people. He has to take recourse to the doctrine of the Relativity of Virtues and Vices to the circumstances of life or the conditions of time and place. Hence he is no advocate of absolute morality and warns people against trying to understand the theory of Right and Wrong, Good and Bad.

80-82. Valour without arms and weapons, householdership without wife, war without unity of purpose, skill without one to appreciate, and danger without friend, do always lead to misery.

83. In danger there is no support besides friends.

[1]84-85. One should satisfy by friendship the person with whom property is undivided, by remuneration the people whose property has been partitioned, and the friend by enjoyments similar to oneself.

86-87. One should enjoy one's own wealth after giving away portions to the king, relatives, wife, sons, friends, servants and thieves.

88-90. The king should give up pride, vanity, miserliness, anxiety, and fear and perform his work in order to promote his own interest; and should maintain the servants by special gifts, *e.g.*, of love, honour and privilege.

91-92. The wealthy man is always being eaten up by Brahmana, fire, and water. He always enjoys happiness, others suffer misery.

93-95. *Darpa* (pride) is the desire for the diminution of others, *Mâna* (vanity) is the idea of superiority to all, *Kârpanya* (miserliness) is stinginess in expenditure, *Bhaya* (fear) is the suspicion about one's own ruin, and *Udvega* (anxiety) is known to be the fickleness of mind.

96-97. Insult from even the insignificant leads to great enmity. Gifts, honours, truthfulness, valour and humility lead to good friendship.

98-100. In times of danger the king should call on the wise men, preceptors, brothers, friends, servants, relatives, and councillors and humbly consult their wishes in the proper manner.

101-2. "I shall do away with the danger, if you give me your counsels. You are my friends and not servants. I have no other sources of help besides you all."

103-4. Half or one-third of salaries should be received by the king for maintenance.

[2]104-5. 'I shall remember the benefit rendered by you and pay back the remainder after getting rid of the trouble.'

---

[1] The different modes of dealing with men according to the nature of the relations. If there has been a partition of property among several members, they should try to gratify one another by means of salaries and rewards, for otherwise there cannot be any friendship among them. But if several people are owners of a joint property the relation should not be that of payment by a master to an officer or servant but that between cordial friends, for in this case no body could care to accept service of somebody, and it would be most undiplomatic of any member to offer salary to others.

[2] In times of emergency the king should pay only half or two-thirds of the fixed salaries to the officers.

[1]106. Without remuneration those officers should serve the master for eight years, who have the wealth of sixteen years, others according to their wealth. *Only the penniless should receive food and raiment from the king, not others.*

109-110. If one should not grieve with those by whom one has been well maintained, one is deprecated as ungrateful by both the master as well as other servants.

111. One should sacrifice life for the man by whom one has been maintained even once.

112-13. He is the excellent servant who does not desert his master in difficulty. He is known to be the master who sacrifices his life for the servants.

114-15. There has never been a vituous king like Rama in this world, of whom even the monkeys accepted service.

116-17. The unity of even thieves can lead to the destruction of the State. Cannot the unity of the king and the officers lead to the extinction of the enemy?

118-19. There was no king like Sri Krishna so well up in falsehoods. He made Arjuna accept his sister Subhadrâ by an artifice.

120. That is said to be Reason (Yukti) according to men well up in Niti which lead to one's welfare.

121-22. One should first form friendship with him who would do one good, and then by professions of virtue &c. should secure what is beneficial (to oneself).

123-24 The recital of others' praises so as to lead to mutual friendship as well as seduction by gifts of desirable commodities, like food, clothing, &c., do always bear fruit.

125-26. Those who pose themselves as mediators generally adopt the methods of swearing, false talk and procrastination.

127-28. The man who does not adopt the means for hiding himself is more senseless than the beast. Even women employ guises to hide their paramours.

---

[1] Here are various grades of officers, some have staying power, others have not. Those that have staying power, are, again, of various grades. Hence in times of danger the portions of salary that are to be deposited with the State for military or emergency purposes would vary. Some would be able to do without half the salary, some without two-thirds for about 8 years, others for other periods, and so on.

129. *Yukti* or "stratagem" is in most cases of the nature of *crafts* or artifices and similarly (there is) another (form of it which) achieves practical results.(?)

[1]130-31 One should use guile with those who generally employ artifices. Otherwise even the great lose their character.

132. There are groups of intelligent people, not single intelligent individuals.

[2]133-34 Those who are well-up in *Niti* employ various kinds of *Niti* and *Yukti* according to time, place and circumstances when they see that the old ones fail.

[3]135-36. Men who are proficient in the science of crafts and artifices can produce guiles by charms, medicines, dress, time and speech, &c.

137-38. One should mark by one's signs, vessels or clothes purchased, sold or made over in the presence of the State officers, and should communicate to the king in order to prevent deceit and thieving.

140. The king should always pay interest for the property belonging to the senseless, the blind and the infants.

141-42. Just as women are of three kinds—one's own, common, and belonging to others, so servants are of three kinds, excellent, mediocre and inferior.

143-45. The excellent servant is he who is devoted to the master. The mediocre is he who serves the giver of remuneration. The worst servant is he who serves another master, even though maintained by one.

[4]146-47. The man who renders beneficial services though injured is excellent but is otherwise bad. The mediocre or second class servant desires equality (or mutuality) of interests. Others are selfish.

---

[1] Falsehoods can be met only by falsehoods but not otherwise. If guiles and artifices are unnecessarily adopted there is the danger of loss of character.

[2] दृष्ट्वा बद्धातु प्राक्तनान् Noticing that the old methods are futile.

[2] काल *e. g.*, magicians' sleights can make people believe that the day is night, the noon is morning and so on.

वाग्भे &c. meaning of words. By Play or Pun on words, double interpretations, ambiguous use of language, &c., clever people can ruin the ignorant folk.

[4] The three classes of servants have been previously distinguished according to their attitude towards the remuneration. In ll. 146-147 the same distinction is brought out from another standpoint *viz*, the study of self-interest. Thus the first class man never cares for self interest but would serve the master even at a sacrifice. The second class man follows the give-and-take morality, serves the master only so long as his own interests are fulfilled साम्यमभिवेत् *i. e.* desires (equality). The third class of man cannot serve at sacrifice. Others care only for self.

148. Nothing can be understood fully by means of *pramânas* (evidences) alone unless there be some (extra) advice regarding it.

149. Whether boyhood or youth, it may lead to the completion of the work begun.

[1]150. In the case of the intelligent man, old age is never to be considered.

151-54. One should begin that work which can easily come to end. The commencement of many things at a time is not satisfactory. One should not commence another work before completing the one begun, for in that ease neither the one is finished, nor the other is gained.

155. The successful man always does that which easily comes to completion.

[2]156-57. If one's interests can be furthered by a quarrel that is also desirable, otherwise that leads to loss of life, wealth, friends, fame, and virtue.

158-59. Zealousy, cupidity, passion, love, anger, fear and recklessness—these seven are known to be the causes of weakness in an enterprise.

160-61. One should indeed set himself to do a work in exactly that way in which it can be done without any imperfections or without meeting with the disapproval of the wise, whether it is late or at the time of distress.

162-63. The master of ten villages, and the commander of one hundred troops should travel on horseback with attendants, the master of one village also should be a horseman.

164. The commander of one thousand troops and the ruler of one hundred villages should each have the vehicle of a chariot and a horse, and ten armed attendants or should travel on horseback

166-167. The ruler of one thousand villages should always travel in vehicles carried by men or two horses. The commander of ten thousand troops should travel with twenty attendants on an elephant.

168-169. The ruler of ten thousand villages can use all vehicles and four horses. The commander of fifty thousand should travel with many attendants.

---

[1] Perhaps in ll. 149-50 the idea is that age is no consideration in the case of workers. A work can be done by people of any age. Hence credit should be given to any body who can successfully complete a work whether a mere child, a youngman or one sufficiently old.

[2] Even a quarrel is to be desired if it leads to success.

[1]170-171. This should be regulated according to the magnitude of the jurisdiction, also in the case of wealthy and qualified people.

172-173. A king who desires good (for himself) should always manage things in his kingdom in such a way that the best should not sink in the scale of honour nor even the low should rise (unduly) high in the scale.

174-175. The king should grant lands in the villages to all classes of men, high, middle and low and in the towns for the houses of men with families.

176-177. To the lowest class the land given should be thirty-two cubits in length and half of that in extent; to the highest class the land should be double this in measure; and to the middle class it should be one and a half that of the lowest class.

178. The land in each case should be just adequate for the members of the family, neither more nor less.

179. The officers and servants of the king are to live outside the village.

180-181. No soldier is to enter the village without royal business, and oppress the villagers any where.

182. Nor should villagers come into daily dealings with the soldiers.

.183-184. The king should daily make the soldiers hear of the virtues that promote valour and witness the musical and dancing performances that also tend to augment prowess.

185. The soldiers should not be appointed to any other work besides warfare.

[2]186-187. If wealthy men of good manners are ruined in a business, the king should protect them and such like men.

[3]188. Those who are rich among troops (?) should be granted proper remuneration, *e. g.*, one-thirtieth in addition to the actual expenditure in the matter of travelling expenses.

---

[1] These lines describe the paraphernalia that should grace the men of high position, the aristocracy or the upper ten thousand, whether of office, wealth, or character. There must be marks by which the "dignified parts" of a State should be distinguished.

[2] Here is an instance of State Intervention in Industry and Agriculture. Losses of honest agriculturists or farmers are to be partically made up by State grants.

[3] पारदेश्य travelling allowance; when such people go abroad on State affairs they are to receive travelling allowance and this at the rate of $\frac{1}{30}$th more than actual expenditure

190. The king should protect their wealth as his own treasure.

191. He should deprive of wealth the rich persons who are dishonest in their dealings.

[1] 192-193. If four times the value has been received by the creditor from the debtor, the former is to receive no more.

Here ends the Fifth Chapter named Supplementary Nīti.

---

[1] **चतुर्गुणवृद्धि** Interest to the extent of four times the capital. This seems to be the maximum beyond which equity recommends remission of interests (?)

THE END.

NOTICE TO SUBSCRIBERS

Part 3 of Vol. XIII completes the Translation (with Notes) of *Sukranitisâra* based on the Text edited by Mr. Gustav Oppert and published by the Government of Madras, in 1882.

We have applied to the Madras Government for permission to publish the Text in our Series. We intend to issue to our subscribers Mr. Oppert's Text, Varie Lectiones, Parallel Passages &c., in a separate part of more than one hundred pages of Royal 8vo. size.

Besides this, Professor Sarkar's Introduction to his own Translation will be published in two Parts of 100 pages each, together with a Glossary of technical terms and difficult words occurring in *Sukraniti*, as well as a Subject-Index.

Among other things the Introduction will contain a study of *Sukraniti* under the following heads :—(1) Geography, Ethnography and Mythography, (2) Agri-Flori-Horticulture, (3) The Animal World, (4) Precious stones and metals, (5) Buildings Palaces, Temples, Images, Forts, Roads, Canal &c., (6) Weapons and Accoutrements, (7) Chemical and Mechanical processes and manipulations, (8) Social and (Educational) as well as Moral (and religious) institutions, (9) Economic Practice and Theory, (10) Development of *Polity and Political* speculation including Jurisprudence, Public Finance, International Law, and (11) Statistics of Rents, Wages, Prices, &c.

THE EDITOR

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FOREWORD.

The translation of *Sukranîti* is based on the text edited by Dr. Gustav Oppert for Madras Government in 1882.

An Introduction to this translation forms Volume XVI of *The Sacred Books of the Hindus Series* and is called "The Positive Background of Hindu Sociology." The discussion of date and *locale* of the treatise is among other topics the subject-matter of that work, of which the table of contents under main headings is given below:

BOOK I.—NON-POLITICAL.

Chapter I. Relativity of Nîti sâstras.
" II. The Data of Ancient Indian Geography.
" III. The Data of Ancient Indian Ethnology.
" IV. The Data of Ancient Indian Mineralogy.
" V. The Data of Ancient Indian Botany.
" VI. The Data of Ancient Indian Zoology.
" VII. The Data of Ancient Indian Art (Architecture, Sculpture and Painting).
" VIII. The Data of Ancient Indian Morals and Manners (including socio-religious rites and institutions).
" IX. The Data of Ancient Indian Pedagogy (including *vidyâs*, *kalâs*, and literature).
" X. The Data of Ancient Indian Economics (including statistics of Prices, Wages, &c).

BOOK II.—POLITICAL.

Chapter I. The Data of Ancient Indian Polity or Constitution, *i.e.*, form of Government (including the theory of Râṣtra or State).
" II. The Data of Ancient Indian Public Finance.
" III. The Data of Ancient Indian Jurisprudence.
" IV. The Data of Ancient Indian International Law (the Doctrine of *Mandala*, as influencing the conceptions regarding 'spheres of influence' and 'spheres of interest.'

These Data are collected from an analytical study of the facts and ideas embodied in Sukranîti, and have been placed as far as possible in their proper historical perspective by comparison with the landmarks of Indian and European thought. The first six chapters of Book I are already out together with five valuable appendices, kindly contributed by Dr. Brajendranâtha Seal, M.A., Ph. D., King George V Professor of Philosophy in the University of

Calcutta, dealing with the scientific concepts of the Hindus regarding Plants and Plant Life, the classification of Animals, the Nervous System of the Tantras, Vital Force, Heredity, Mechanics and Acoustics.

I beg to acknowledge my indebtedness to Pandit Yogendranâtha Tarka-Sâṃkhya-Vedântatirtha of Susung (Mymensingh), with whom I read portions of Sukranîti, Râja-tarangiṇî, some of the Purâṇas, and other Sanskrit works.

I have also to thank Kumar Narendra Nâth Law M.A. B.L., author of ***Studies in Ancient Hindu Polity*** (based on the Arthasâstra of Kautilya) for the labour he has kindly undergone in preparing the Index to this translation.

Nor must I omit to express my gratefulness to Major B. D. Basu, I.M.S. (Retd.), the learned editor of the Series, and Prof. Râdhâkumud Mookerji, M.A., Premchand Roychand Scholar, author of *A History of Indian Shipping*, from whom, among others, I have derived help in manifold ways during a period of ill-health and distraction in the midst of which the translation was finished.

Finally, I have to add that the work is humbly dedicated to Pandit Iśwara Chandra Vidyâsâgara, the great Indian Educator of the 19th century.

April, 1914. BENOY KUMAR SARKAR.

Index to Important words in Sukraniti

(The references are to slokas in Gustave Oppert's Edition.)

श्रीः ।

शुक्रनीतिः

प्रथमोऽध्यायः ।

१ जगदाधार, सर्ग, भार्गव, पूर्वदेव,
२ स्वयम्भू,
३ भूभृत्,
५ लोकस्थिति,
८ प्राकृत,न्याय,तर्क,विधि,मीमांसा,
१० व्यवहारी,
११ अशन,
१३ गद,
१७ सर्वतोमुखी,
१९ राष्ट्र,
२० शास्ता, पाता, रञ्जक, प्राक्तन,
२५ मनुज,
२६ अभिषिक्त,
२८ तिर्यक्,
२९ सात्त्विक, राजस, तामस,
३० यष्टा,
३१ दानशौण्ड,
३२ निर्घृण,
३४ तिर्यक्त्व, स्थावरत्व,
३६ दिष्ट,
३९ वर्ण,
४० दान्त,
४२ पण्यजीर्वा,
४३ सीर,
४६ भवितव्य,
४८ पुरुषकार, दैव,
५३ स्नेह, वर्ति,
५४ क्षपन,
५६ वनभङ्ग, गोग्रह, रावण, भीष्म,
५८ बलि, हरिश्चन्द्र,
६० क्रौर्यं,
६१ अमात्य, कोश, बल,
६२ हृक्,
६४ शशाङ्क, तोयधि,
६५ कर्णधार, विप्लवन्ते,
६७ त्रिवर्ग,
६८ वैजवन, नहुष, रसातल,
६९ वेन, पृथु,
७१ अर्क, वित्तेश, निर्ऋत्य, शाश्वती,
७२ जङ्गम, स्थावर,
७६ निधि, धनाधिप,
७७ वैश्रवण,
९० स्वान्त,
९५ दायाद,
९७ विप्रमर्या,
९८ आमिष,
१०० करी, ग्रह,
१०२ दर्भाङ्कुर, लुब्धक, मृगयते,
१०३ द्रुम,वारण,
१०६ द्विरेफ,
१०८ द्यूत,
१०९ नल, धर्म्म,
१११ रहः,
११३ दण्डक्य, नहुष,
११९
१२१ पनः
१२३ राजसूय,
१२५ षण्डतिल,
१२७ षण्ड, मल्ल,

१३० गूढचार,
१३४ रजक,
१४० व्यसन,
१४१ अन्वय, सङ्घ,
१४२ मृगया, अक्ष, पाण्डु,नैषध, वृष्णि,
१४३ षड्वर्ग,
१४४ जनमेजय, पेल, वातापि,
१४५ पौलस्त्य,
१४६ जामदग्न्य, अम्बरीष,
१४९ श्रुति, स्मृति,
१५१ नभःस्पृश,
१५२ आन्वीक्षिकी, त्रयी, वार्ता, दण्ड, नीति,
१५५ अङ्क,
१५६ कुसीद,
१५९ प्राणभृत्, कृपण,
१६२ हिमांशुमाली,
१६४ आशीविष,
१६५ अभ्यर्हणीय,
१६८ द्विषत्, शिखी, केका,
१६९ शिखण्डी, विपश्चित्,
१७२ संवनन,
१७३ अनूचान, भूति,
१७६ द्राक्,
१८१ अञ्जसा,
१८२ कर्ष,
१८४ सामन्त, माण्डलिक,
१८६ स्वराट्, सम्राट्, विराट्,
१८७ सार्वभौम,
१९० हीनसामन्त,
१९२ नायक, आशापाल,
१९३ कुम्भ,
१९४ कोश,
१९९ वसु, मुनि, निवर्तन,
२०४ परिवर्तन,
२०५ परिवर्तन,
२०७ निवर्तन,
२०८ परिवर्तन,
२१२ आराम,
२१५ वर्तुल, चतुरश्र, परिखा,
२१६ वीथिका,
२१९ एक भुज,
२२२ यामिक, उपकार्या,
२२४ घरठ,
२२८ धर्म्माधिकरण,
२३६ छदि,
२३९ नालिकास्त्र, गुल्म,
२४७ द्विभूमिक,
२४९ प्रतिरूपक,
२५४ सादी,
२५५ बृहन्नालिकयन्त्र,
२५९ पत्तन,
२६८ अभियुक्त,
२७७ व्यवहार, मुद्रित,
२८० मुहूर्त,
२९१ भृति, दत्तलग्नक,
२९७ उत्कोच,
३१० उन्मान,
३२८ बभ्रु,
३२९ मागध,
३३९ वर्णी,
३४४ षण्ड,
३४९ तुर्यांश,
३५० महानस,
३७२ भट,
३७८ अभ्यासागस्कृत्,

प्रथमोऽध्यायः समाप्तः ।

द्वितीयोऽध्यायः ।

२ मन्त्र, मन्त्री,
३ सभ्य,अधिकारी,प्रकृति,सभासत्,
४ भिन्नराष्ट्र, भिन्नप्रकृति,
५ आगम,अनुमान,सादृश्य,साहस, छल,

६ व्यवहार,
७ सहाय,
१० दितिज,
१२ युवराज,
१४ मुद्रा,
१६ स्वस्त्रीय,
२२ धनुर्वेद,
३० सापिण्ड्य,
३२ दत्तक,
३६ राजवल्लभ,
४६ चार, सूचक,
५९ भृति,
६० आगस्कारी,
६७ उत्कोच,
७० पुरोधाः
७२ प्रतिनिधि, प्रधानसचिव, प्राड्विवाक,
७२ अमात्य, दूत,
७९ षडङ्गवित्, साङ्ग धनुर्वेद, अर्थ,
८० व्यूह,
८३ बल, कोश,
८६ सुमन्त्र,
८७ षाड्गुण्य
९४ साद्यस्क, गोल, अग्निचूर्ण,
९६ साम, दान, भेद, दण्ड,
९७ साक्षी,
९८ अनुमान, उपमान,
१०५ शुल्क,
१०६ अकृष्टपच्य,
१०७ नाष्ठिक,
१२२ साहसाधिपति, ग्रामनेता, शुल्कग्राह, प्रतिहार,
१२३ मान्त्रिक,
१२८ प्रभद्रक,
१२९ आधोरण,
१३२ धुर्य, युग्य,
१३४ सादी,
१३६ चक्रित, रेचित, वल्गित, धौरित, आप्लुत, तुर, मन्द, कुटिल, सर्पण, परिवर्तन, स्कन्दित,
१३७ पल्याण,
१४१ पत्तिपाल, गौल्मिक,
१४२ शतानीक, अनुशतिक,
१४५ सेनानी, यामिक, पत्तिप,
१४७ लेखक,
१४८ नायक,
१५३ कोशाध्यक्ष,
१५४ कौशेय,
१५५ कञ्चुक, नेपथ्य, सौचिक, रञ्जन,
१५६ वितान,
१५८ पाकनायक,
१५९ आरामाधिपति,
१६० परिखा,
१६३ सम्भाराधिप,
१६६ दानाध्यक्ष,
१६९ सत्राधिप,
१७१ साहसाधिपति,
१७२ ग्रामप,
१७३ भागहार,
१७६ शौल्किक,
१८१ मीमांसा, तर्क, वेदान्त,
१८२ संहिता, होरा
१९० दण्डधार,
१९५ वैतालिक,
१९६ भाण,
१९७ महानालिकयन्त्र,
१९९ धातुविलेपक,
१९९ तक्षा, वाशिक, मलहारक,
२०२ नाविक, किरात, भारिक,
२०३ आपणिक, शाकुनिक, चर्म्मक
२११ दूत्यस्थ,
२१८ गोष्ठी,
२२० प्रह्ल,
२२२ ष्ठीवन, जृम्भण, गात्रभङ्ग, पर्वा-

	स्फोट,
२२८	कार्यमिषतः,
२२९	स्थाणु,
२४४	उपायन,
२७२	उत्कोच,
२८४	हस्तिपक,
३००	वृत्तलख्य,
३०१	जयपत्रक,
३०२	आज्ञापत्र,
३०३	ऋत्विक्,
३०६	भोगपत्र,
३०७	विभागपत्र,
३०८	दानलेख्य,
२०९	क्रयलेख्य,
३१०	सादिलेख्य,
३११	संवित्पत्र,
३१२	ऋणलेख्य,
३१३	शुद्धिपत्र,
३१४	सामयिक पत्र,
३१५	सम्मति पत्र,
३१७	अन्वय, व्यावर्तक,
३१९	क्षेम पत्र,
३२०	भाषा पत्र,
३२२	व्याप्य, व्यापक,
३२६	औपनिध्य, याचितक, औत्तमर्णिक,
३३२	कुसीद,
३३४	पार्थिव,
३३६	भाठक,
३३८	पुनरावर्तक, स्वत्वनिवर्तक,
३३९	उपनिधि,
३४५	उपभोग्य,
३८८	गुञ्जा, कर्ष, प्रस्थ, आढक,
३९५	सावन,
४२७	रीति,

द्वितीयोऽध्यायः समाप्तः।

तृतीयोऽध्यायः।

२	त्रिवर्ग
३	अङ्घ्रि, मलायन,
४	अनुल्बण, सिद्धमन्त्र,
५	आतपत्र, पदत्राण, मौली,
७	अस्तेय,
१२	पेषल,
१६	प्रमाथी,
१७	पण,
१८	स्वान्त,
२२	षण्ड,
२५	चैत्य, वलि,
२६	स्कन्न,
३१	अमेध्य,
३२	अभ्यवहार,
३७	अघ,
३९	समास, व्यूह, हेतु, स्तुति, अर्थवाद,
५०	आप्त,
५८	ऊहवान्,
७२	अन्वय,
८९	असु,
९३	अवलिप्त,
१११	विघस,
११२	निर्हार,
११३	षड्रस,
११४	नियुद्ध,
१२२	स्नुषा,
१४८	विदग्ध,
१५५	अङ्ग, उपवेद,
१६३	प्रौष्ठपाद,
१७५	ऋषि,
१८४	कुसीद, कला,
१९२	प्रतिभू,
२१०	संविद्दत्त,
२११	श्रियादत्त,
२१२	ह्रीदत्त,
२१३	भीदत्त,

२१४ पापदत्त,
२२३ तिमिङ्गिल,
२२८ भठ ,
२३७ धैर्य,
२३८ वावदूक,
२५० ब्रह्मकोश,
२७८ आध्वर्यव,

तृतीयोऽध्यायः समाप्तः ।

चतुर्थोऽध्यायः ।

प्रथमं प्रकरणम् ।

१६ स्नुषा, श्वश्रू, ननान्दृ, यातृ,
२९ उदासीन,
३७ सामन्, दान, भेदन, दण्ड,
४४ अङ्कन,
४५ व्यस्तक्षौर, असद्यान,
४९ आततायी,
५० अवलिप्त,
६२ स्त्रैण,
६६ कर्णजप,
६९ अभ्यस्त,
९७ कितव, जार,
९८ न्यास,
१०० नक्षत्र-सूची,
१०४ वृषल,
११७ पण, कार्षापण,

(द्वितीयं प्रकरणम्)

१ कोश,
३० अग्निचूर्ण,
४१ वज्र, वैदूर्य्य, गोमेद, विद्रुम, इन्द्रनील, पुष्पराग, पात्ति, माणिक्य,
४३ भौम, चाष,
४६ ओतु,
४७ गारुत्मत,
५० चिपिट, सित,
५२ कोकनदच्छवि,
६० कञ्चुक, जरठ,
६५ क्षुमा, रक्त, कृष्णालक,
६६ ठक्कु,
८७ वक्कु,
९४ प्रस्थ,
९७ ताल,
९८ पल,
१०३ निष्क,
१२० अवि,
१२८ वार्द्धुषिक,
१२९ आपणिक,

(तृतीयं प्रकरणम्)

१ राष्ट्र,
४ अघ,
७ आधि,
११ साङ्कय, प्रतिलोम, अनुलोम,
१५ कला,
१६ इज्या,
१९ सीर,
२२ रहस्य,
३० मन्त्र, ब्राह्मण,
३३ वृत्त, अध्वर्यव,
३४ उद्गीथ,
३७ व्यूह,
३८ उदात्त,
३९ उपसंहार,
४० सवन,
४२ श्रौतकल्प, स्मार्त्तकल्प,
४३ निरुक्त,
४४ होरा,
४८ प्रकृति, विकार,
५१ पुरावृत्त,
५२ सर्ग, प्रतिसर्ग,
५३ स्मृति,
५४ नास्तिक,
५५ अर्थशास्त्र,
५८ शिल्पशास्त्र,
५९ अलङ्कृति,

६० काव्य,
६१ दैशिकी, कौशिक,
६२ यावन,
६७ हाव,
८३ आसन, मुद्रा,
९७ पल्याण,

(चतुर्थं प्रकरणम्)

१ वानप्रस्थ, यति,
५ प्रव्रज्या,
९ महानस,
१४ वैश्वदेव,
१९ आहुति,
२२ सलोकता,
३५ विप्रविप्रा,
४४ गङ्गागृह,
४६ तिथि,
४७ अवि, शकृत्,
५१ अभ्यर्ण,
५४ कुलत्थ,
६२ प्रतानवती, स्तम्बिनी, गुल्मिनी,
६६ शृङ्गाटक,
६७ चतुरश्र,
६८ गोपुर,
७५ पैष्टी, वार्क्षी,
८१ योगमुद्रा,
८५ ताल,
९४ हनु,
९९ कूर्पर,
११२ निष्पाव,
११३ कर्णपाली,
१३९ स्नव, लड्डुक, मातुलुङ्ग,
१५२ समस्त, व्यस्त,
१८९ वस्ति, सक्थि,
१९० गुल्फ,

(पञ्चमं प्रकरणम्)

५ प्राड्विवाक,
६ वादी,
१० अनीक,
१८ कीनाश, शोणिनर्तक, लिङ्गी,
३७ अध्वर,
६० अर्थी, प्रत्यर्थी,
६४ व्यवहार,
६८ स्तोभक,
८३ उत्कृती,
९१ पूर्वपक्ष,
९७ आसेध,
१०२ यियक्षु,
१०६ अकल्य,
१३२ निरावाध,
१३५ निरर्थ,
१३९ निर्दुष्ट,
१४४ प्रत्यवस्कन्दन,
१४५ प्रतिपत्ति;
१४९ प्राङ्न्याय,
१५० जयपत्र,
१५३ पूर्वपक्ष, उत्तरपक्ष,
१५४ साध्य, साधन,
१६२ भुक्ति,
१७३ भागपत्र,
२११ लेख्यबिम्ब,
२२३ निक्षेप, उपनिधि,
२४२ कर्ष,
२५० शस्त,
२५३ सोपध,
२५७ निक्षेप,
२५९ पूग,
२७६ पौनर्भव,
२८८ त्रिसर्ग,
२९८ सौदायिक,
३२४ वङ्ग, जसद,

(षष्ठं प्रकरणम्)

१ पेरिग्,
२ पारिख, पारिघ,
३ धन्वदुर्ग,

(सप्तमं प्रकरणम्)

२	स्वगमा, अन्यगमा, दैवी, आसुरी, मानवी,
९	मौक, साद्यस्क,
१०	गुल्मीभूत, अगुल्मक,
११	मैत्र, प्रपालित,
१४	आरण्यक,
२१	क्रमेलक,
२२	बृहन्नालीक,
२३	नाग,
२४	लघुनालिक,
२६	कर्ष,
२८	सादी,
३४	भद्र, मन्द्र, मृग, मिश्र,
४७	परिणाह,
४८	शफ, मणिबन्ध,
५३	मुष्क, त्रिक,
५९	सटा,
६९	सक्थि, प्रोथ,
७२	चिबुक,
८०	स्वस्तिक,
८५	त्रिकूट,
८८	सर्वनामा,
१०१	ककुत्,
१०७	भ्रमरी,
१०९	पञ्चकल्याण,
११०	अष्टमङ्गल,
१११	जयमङ्गल,
११७	दलभङ्गी,
१२२	खलीन,
१३६	हरिमन्थ, मकुष्टक,
१३८	पल्याण,
१४४	धारा, आस्कन्दित, रेचित, प्लुत, धौरितक, वल्गित,
१४५	पार्ष्णि, तोद,
१५९	सन्दंश,
१८२	मौल,
१९१	अस्त्र, शस्त्र, कुन्त,
१९५	तिलबिन्दु,
१९६	बुध्न,
१९७	अग्निचूर्ण, शलाका, पत्ति
१९८	त्वक्सार, गोल,
२००	सुवर्चि लवण, पल, अर्क, स्नुही,
२०७	कान्तरजः ।
२१०	कर्ण,
२११	शिलीमुख,
२१२	अष्टाश्र, बुध्न, पट्टोश,
२१४	प्रास,
२१५	कुन्त, शङ्कुबुध्नक, पाश,
२१७	करज,
२२५	शकुन,
२३२	सन्धि, विग्रह, यान, आसन, समाश्रय, षड्गुण,
२४७	समय,
२५४	विगृह्ययान,
२५६	पार्ष्णिग्राह, सन्धाय गमन,
२५७	साम्परायिक,
२५८	प्रसङ्ख्यान,
२५९	उपेक्षायान,
२६२	ध्वजिनी,
२६४	मकरव्यूह, श्येनव्यूह, सूचीव्यूह,
२६५	शकटव्यूह, वज्रव्यूह, सर्वतोभद्रव्यूह, चक्रव्यूह, व्यालव्यूह,
२७०	संमीलन, प्रसरण, परिभ्रमण, आकुञ्चन, यान, प्रयान, अपयान, समुत्थान, लुण्ठ,
२७२	पंक्तिवेशन, धारण, सन्धान, लक्ष्यभेदन, मोक्षण, परिधातन,
२७४	स्वगूहन, पतीघात, अपसरण, उपसर्जन,
२७८	क्रौञ्च,
२८२	अमार्ग, अष्टवलयी, गोलक, सर्वतोमुख,
२८४	आसन,
२८६	यवस,

२८८	सन्धायासन
२९९	उपायें
३०६	शौण्डीर,
३०७	कदन,
३१९	गोष्ठी,
३२०	इज्या,
३२२	प्रतोली,
३२६	भ्रूण,
३३८	प्रतिलोम, अनुलोम,
३४१	मल्लूर, कफीनि,
४५९	विसग्राह
३६९	प्रत्यग्र,
३७२	कूटस्वर्ण,
३७५	कूप्य,
३७७	तूर्य,
४११	कीलकोष्ठ,

चतुर्थोऽध्यायः समाप्तः

पञ्चमोऽध्यायः

१	खिल,
११	तरक्षु,
४७	दर्प, मान, कार्पण्य, भय, उद्वेग,
६७	प्राक्तन,

पंचमोऽध्यायः समाप्तः ।

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